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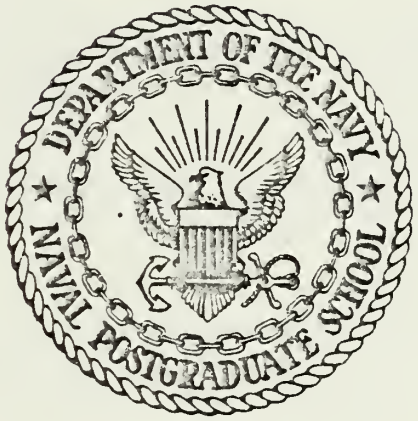

THESIS

MANPOWER MODELING IN THE AIRBORNE COMMUNITY
OF THE UNITED STATES ARMY

by

Dimitrios Theoharis Koutianoudis

September 1984

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With the evolution of new sophisticated technology, military manpower planning problems involving specialized training have become increasingly important. This problem has become especially urgent for the airborne community of the U. S. Army because this community has a variety of special training requirements which make the problem especially complex when other dimensions such as grade level and military occupation

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Manpower Modeling in the Airborne Community of the United States Army

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ABSTRACT

With the evolution of new sophisticated technology, military manpower planning problems involving specialized training have become increasingly important. This problem has become especially urgent for the airborne community of the U.S. Army because this community has a variety of special training requirements which make the problem especially complex when other dimensions such as grade level and military occupation specialty are also taken into account. This thesis formulates a methodology which applies Markov chain theory to forecast future inventories and uses marginal analysis to determine the optimal numbers of soldiers with certain skill levels and job types who should enter special training. The goal of the optimization model is the minimization of the maximum percentage shortage of personnel relative to authorization. The methodology is used with FY 1984 data to determine the optimal numbers of soldiers to enter special training during fiscal years 1984 and 1985 to minimize the maximum percent shortage.

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I. INTRODUCTION

In the last two decades, with the evolution of new sophisticated technology, military manpower planning problems invclving specialized training have become increasingly important. Critical questions of how many people to train and hcw to train them have to be answered by the military in crder to optimize the effectiveness of their forces. This problem has become especially urgent for the airborne community cf the United States Army. This community has a variety cf special training requirements which make the prcblem especially complex when other dimensions such as grade level and military occupation specialty are also taken into account.

In an earlier thesis Captain Donald B. Chung formulated the manpcwer planning problem of a section of the airborne community and solved it by dynamic programming. That fcrmulation minimized the sum of the squares of the shortages for all duty positions ccnsidered [Ref. 1]. In this thesis the airborne community as a whole is considered, a different cbjective function is formulated, and slightly different constraints are used.

The remainder of this chapter will provide some basic information about the airborne community whose perscnnel planning is the subject of this thesis. More detailed information about the airborne community can be found in [Ref. 2].

Chapter 2 discusses formulation of the model. It presents a mcdel which will forecast personnel requirements for each type of special training and project those requirements into future years by utilizing Markov Chain theory. Additionally it will examine the application of marginal

analysis as a viable optimization strategy in determining an optimal training policy in the airborne community.

Chapter 3 discusses the execution of the model. Chapter 4 demonstrates the potential of the model as a decision making tool and as a manpower planning model.

A. THE AIRBORNE COMMUNITY

1. Grade and Skill Levels

A soldier in the United States Army is recruited for two, four or six years (and may renew the recruitment repeatedly for two, four or six years). During the period of enlistment a soldier may be promoted through various grade levels. Initially a soldier enters the service at grade level one. In order for an individual to be promoted from one grade level to the next grade level, he must stay in the grade a specific period of time and be selected by a centralized selection board.

The nine enlisted grade levels as correlated with rank are listed in Table 1 .

TABLE 1

Grade Levels as Correlated with Ranks and Skill Levels

GRADE	RANK	SKILL LEVEL
E-1	Private	1
E-2	Private	1
E-3	Private First Class	1
E-4	Specialist	1
E-5	Sergeant	2
E-6	Staff Sergeant	3
E-7	Sergeant First Class	4
E-8	Master Sergeant	5
E-9	Sergeant Major	5

Additionally, a soldier in the U.S. Army has a skill level (SI) identifier which is an indicator of his technical and tactical experience. These skill levels are closely related to the grade levels. The relationship between skill and grade levels is also listed in Table 1 .

The skill level identifier used is a two-digit code with the first being the skill level, and the second digit being a zero.

2. Military Occupation Specialty (MOS)

After the completion of basic training and advanced individual training each soldier in the U.S. Army is awarded a Military Occupation Specialty (MOS). There are 365 MOS's for which a soldier may be trained. The MOS designation used is a two digit number followed by a letter (e.g. cook (94B), infantryman (11B)). Combining MOS's with all possible skill levels that a soldier can have in that particular MOS creates a total of about 1200 MOS/SL combinations.

3. Career Management Field (CMF)

A soldier has a career pattern to follow. This pattern consists of a network of jobs specified by MOS and SL. Each MOS is included in only one CMF. There are thirty one Career Management Fields (CMF's) in the United States Army. As an example, the career progression for CMF 16 is diagrammed in Figure 1.1 . This diagram shows, for example, that a Hawk missile crew-member of skill level one (16D10) advances through 16D20, 16D30, 16D40 then to 16Z50 and finally to C0Z50. All the career progression patterns, as they appear in [Ref. 3], are shown in Appendix A.

4. Skill Qualification Identifier (SQI)

After the award of the MOS, a soldier can undergo special training which, in case of successful completion,

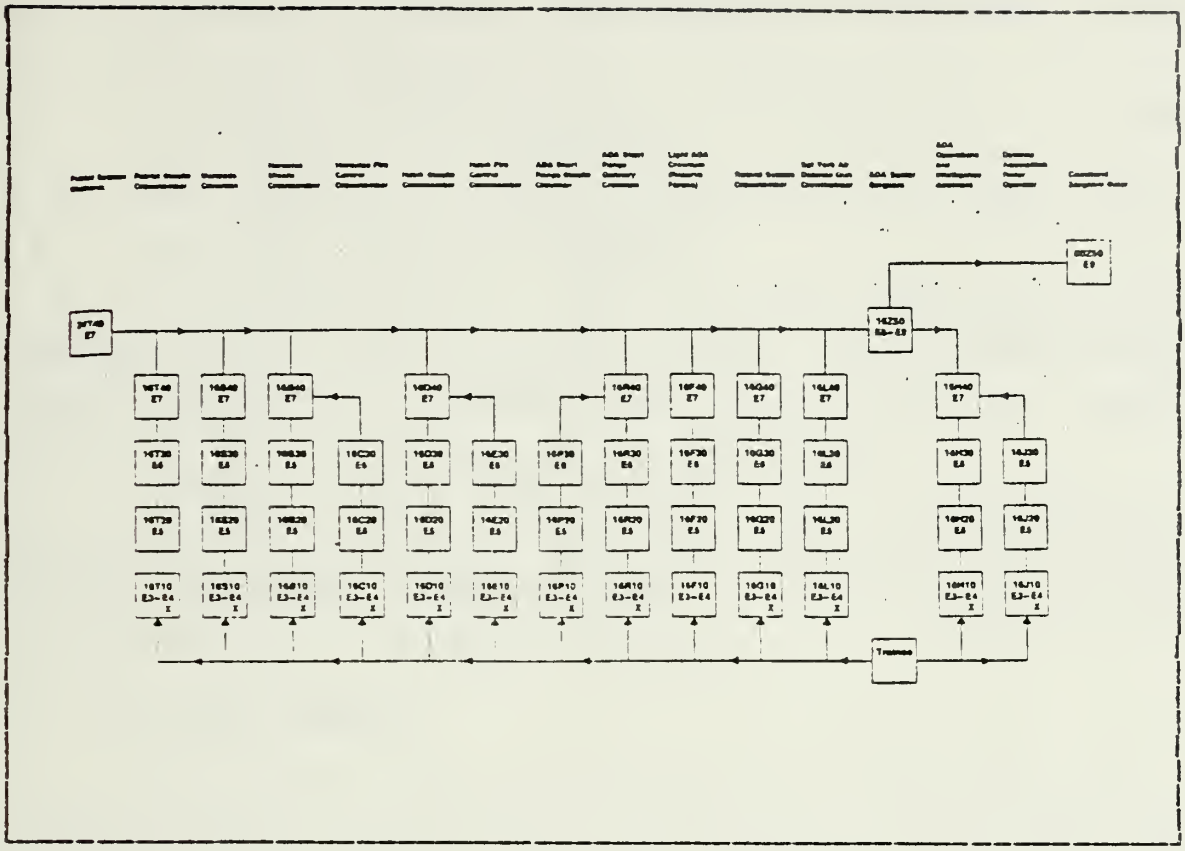

Figure 1.1 Career Progression Pattern for CMF 16

will award a Skill Qualification Identifier (SQI). There are twenty nine SQI's within the United States Army. Only those relevant for the airborne community will be considered in this thesis. For example, a cook of skill level 1 who successfully completes ranger training is awarded the SQI of 'V' for ranger, and his complete job type, grade level, and job skill then will be 94B10V.

There are four types of special training within the airborne community:

a) Airborne training. Each graduate of this training is awarded the skill qualification of P for parachutist.

b) Ranger training. Each graduate is awarded the SQI of V for ranger.

c) Special forces training. Each graduate is awarded the SQI of S for specialist.

d) Pathfinder, not considered in this thesis due to the small number of soldiers .

Recruitment for P, or V training takes place among soldiers of all MOS's and skill levels, but the recruitment largely consists of soldiers with MOS 11B and SL's 1 and 2 for P, or with MOS 11E and SL's 2 and 3 for V.

During FY84 a new CMF (CMF 18) was created to include all special forces personnel, and SQI S was discontinued. Personnel possessing SQI S at that time were given the opportunity to convert to CMF18.

5. Duty Position

In the US Army each soldier is qualified for a special type of job and that is indicated by his MOS, SL, and SQI. For example a soldier with skill level 1, MOS 13B-Cannon Crewman, and SQI P, is qualified for duty position 13B10P. There are about nine hundred fifty duty positions in the airborne community.

6. Manpower Requirements

The levels of authorization by year for the airborne community are given by the personnel structure and composition system (PERSACS) document and for the purpose of this thesis are assumed to be known. When it is necessary to work with future predictions and there are no available tables of authorizations, the current authorizations will be assumed to remain constant. The PERSACS document gives the authorizations for each duty position (as it is specified by MOS, SL, and SQI) and reflects levels annually determined based upon current military size, mission, and budget constraints.

Depending on the mission of the unit the authorization may be above or below the strengths shown by the table of Organization and Equipment (TOE) documents.

In order to support the assignment policy of rotation in and out of the airborne community the manpower pool factor was created. This is the surplus for each duty position that ought to exist outside the airborne community in order to fill vacancies created upon the departure of soldiers from the airborne community, and to provide soldiers with SQI P, V, or S an opportunity to serve in duty positions outside the airborne community. The authorizations including the pool factor for each duty position can be obtained by multiplying authorizations (without the pool) by two.

The vacancies created by attritions from, as well as by internal movements within, the airborne community result in an increase of total shortages. Shortages are defined as the difference between the authorized inventory level and the on-hand inventory level in each duty position. A negative shortage implies that on-hand inventory is greater than the authorization and represents a surplus for that duty position.

Attritions in the airborne community can result from:

a) personnel leaving the community voluntarily by an expiration of term of service, or involuntarily as a result of punitive or administrative discharge;

b) personnel conducting a permanent change of station out of the airborne community. This is a voluntary reassignment out of the airborne community and, prior to this assignment, the soldier must voluntarily withdraw his qualification of P, V, or S from his official military record.

On-hand inventory levels are recorded by the Army Military Personnel Center (MILPERCEN) as ending inventory levels of the fiscal year (FY). These inventory levels are recorded by MOS, SL, and SQI. Ending inventory levels for a year will be assumed to be the same as the beginning inventory levels for the following year.

7. Funding of Special Training Within the Airborne Community

Soldiers in the airborne community receive hazardous duty pay for being in 'jump status' or training for it. The budget allocated for this purpose consists of two separate accounts: one to be used for training soldiers and the other for paying soldiers already trained and serving in jump status. This thesis will be concerned only with the amount allocated for soldiers in training.

8. Frequency of Training and School Capacity

Airborne training is a three week course. Fifty such classes are cycled throughout the year with each class limited to 400 soldiers. Ranger training is conducted five times per year with each class limited to 200 soldiers and the training period being eight weeks in duration. Special Forces training is conducted twelve times per year with each class limited to 100 soldiers and the training period being twelve weeks in duration.

B. PROBLEM DEFINITION

The purpose of this thesis is the development of a manpower model to predict personnel shortages in all duty positions in the airborne community as determined by Military Occupation Specialty (MOS), Skill Level (SL), and Skill Qualification Indicator (SQI). The objective is to

answer the question: "How many soldiers from each MOS/SL ought to be sent for training for each of the three SQI's P, V and S in order to minimize future shortages of the airborne community and increase its operational readiness?" Obviously any selection for training would result in a decrease of the existing shortage or in the creation of a surplus, either of which is beneficial. However, when the desire to minimize future shortages is combined with the goal of increasing the operational readiness of the airborne community, the need to define the selection criterion more carefully becomes apparent. Chapter two considers how this selection could be done in order to be of use to the airborne community.

1. Forecasting Future Stocks

Manpower planning is matching the supply of people with the jobs available [Ref. 4]. In the airborne community those duty positions that are vacant are the jobs available, and each duty position (e.g. 94B20P-cook skill level 2, parachutist qualified) can be considered as a specific state into which a soldier can be recruited or promoted, and out of which he can be promoted or attrited.

The objective of forecasting is to predict future inventory levels in the airborne community given current stocks, total recruitment into the community, and flows within and out of the community.

2. Optimization of Training Requirements

Once the future inventory levels are predicted for the beginning of a specific fiscal year, shortages in certain job types can also be predicted. The budget with which to train new soldiers and maintain the current force levels sets limits on how many soldiers can enter into special SQI training. Additionally, the capacity of the

school which conducts each type of SQI training constrains the number of soldiers who can enter into that SQI training. The questions to be answered are:

a) how many soldiers from each MOS/SL ought to be sent for training given a restricted budget and school capacity, and

b) what should be the selection criterion: maximum absolute shortage, maximum percentage shortage, or some other criterion?

II. MODEL FORMULATION

The formulation of the model consists of two different submodels which together will forecast future stocks and determine the optimal training policy i.e. how many soldiers are to be sent for SQI training from each MOS/SL combination so that the operational readiness of the airborne community is maximized.

A. FORECASTING MODEL

1. Conservation of Flow

A common characteristic of manpower models is the conservation of flow. Every individual is classified in the system into classes 1 through M, where each of the 31 CMF's, as discussed later in this thesis, is an independent system, and M represents the total number of duty positions within a CMF. Class 0 represents the state outside of the system. Every individual who is present in the system at observation time t, must be in some class at previous observation time (t-1) and also at the subsequent observation time (t+1).

The following equation is the fundamental relation of flow conservation. It equates the number of people in class i at time t to the number of people moving into class i during period (t-1,t) and to the number leaving class i during period (t,t+1).

Let $N_i(t)$ = number of people in class i at time t, and

$f_{ij}(t)$ = the number of people moving from state i to state j during period (t-1,t).

Then

$$\sum_{j=0}^{M} f_{ji}(t) = N_i(t) = \sum_{j=0}^{M} f_{ij}(t+1) , \qquad \text{(eqn 2.1)}$$

for all i=1,2,...,M, and for each t.
Note that the flow f_{ii} from i to i, representing the number of people who stay in class i from time t to time (t+1), must also be included in the sums on each side of equation (2.1).

2. Cross-Sectional Models

The models classified under this term require no knowledge of historical personnel movements prior to time (t-1).

A strong point in favor of such models is that most organizations keep only current files on personnel, although such records may be kept for a number of years. These records make it easy to determine the structure of the organization at the end of each accounting period which may be a month or a year.

3. Fractional-Flow Assumptions

In fractional flow models, [Ref. 9], it is assumed that the fraction of the stock $N_i(t-1)$ in class i at time (t-1) that flows to class j during time period t is a fixed proportion q_{ij} independent of t. The quantity q_{ij} is also referred to as the transition probability from i to j.

Thus the flows at time t can be written as:

$$f_{ij}(t) = q_{ij} \cdot N_i(t-1) \qquad \text{(eqn 2.2)}$$

for all t and for i=1,2,...,M; j=0,1,2,...,M.
For example, let i represent the duty position 11B10P and j the duty position 11B20P, then $f_{ij}(t)$ shows the number of

infantryman with SQI 'P' who were promoted from SL 1 to SL 2 during time period (t-1,t) which corresponds to fiscal year t in this thesis.

Using equations 2.1 and 2.2, stocks for class j=1,2,...,M at time t can be expressed as follows:

$$N_j(t)=\sum_{i=0}^{M} f_{ij}(t)= f_{0j}(t) + \sum_{i=1}^{M} q_{ij} \cdot N_i(t-1) \qquad \text{(eqn 2.3)}$$

where $f_{0j}(t)$ number of soldiers recruited during period (t-1,t) for duty position j.

Let Q be the MxM matrix of q_{ij}'s, known as the transition matrix. Then equation 2.3 in matrix notation becomes:

$$N(t)=[N(t-1)]' \cdot Q + f_0(t). \qquad \text{(eqn 2.4)}$$

Here N(t), and N(t-1), represent column vectors of stocks at times t and t-1, and $f_0(t)$ stands for the column vector of recruitment. The prime symbol means the transpose of the column vector, i.e. a row vector.
Equation 2.4 is the basic fractional flow model and is sometimes called the Markov model [Ref. 10].

Given the stocks at time t-1, the recruitments during period (t-1,t), and the matrix Q, it is possible to predict stocks at time t using equation 2.4.

An assumption required by this model is that each person is subject to only one transition during a single fiscal year. This assumption may be violated in reality as some soldiers may have two transitions in the same year, for example a promotion and an attrition might both occur. The frequency of this occurrence is very small and it is normally prohibited by existing policies. A soldier who is reclassified into a new MOS is normally withheld from promotion consideration, while a soldier who is promoted is restricted from changing his MOS. However, a soldier may be

promoted and attrited from the airborne community within the same fiscal year. This occurrence is largely limited to SL 1 soldiers. Promotions from higher SL's incur an additional time-in-service obligation and preclude attrition during the same fiscal year.

Under the assumption that the distribution of movements from class i to class j is the same each time period (year) the matrix Q can be estimated using data from more than one year [Ref. 12].

4. Hindsight and Foresight Concepts

The terms "hindsight" and "foresight" refer to two variations of the basic fractional flow model described in the previous section.

The difference between the hindsight and foresight models is in the way recruitment is treated. The hindsight model uses a recruitment policy which allows one or more accounting times to pass before a vacancy is filled. This model starts filling vacancies during the period after the period when they were created. The foresight model uses a recruitment policy which attempts to anticipate future vacancies and fill them during the time period that they are created. Thus, the foresight model tries to prevent shortages from taking place.

5. Generation of Transition Matrices

The cross-sectional model as it is represented by equation 2.4 can be used to predict future movements of personnel and end-strength inventories by duty position in the airborne community. For the remainder of this thesis the fiscal year (FY) will be the time period considered.

The Q-matrix is a representation of the interrelationships among MOS's, SL's, and SQI's. When no interrelationships exist between the CMF's, then a separate

transitiocn matrix for each CMF is generated, and the stock vector N can be deccmposed by CMF into smaller force level vectors that correspcnd to each CMF. In the airborne community movements among CMF's are negligible [Ref. 6], hence, a separate Q-matrix can be generated for each CMF.

The first step in generating the transition matrix for a CMF is to extract from a given year's data the internal flows among classes.

Dividing the flow from class i to class j during time period (t-1,t) by the stock in class i at time t-1 we get an estimate of the fraction q_{ij}. Performing this procedure for all i and j = 1,...,M results in the Q-matrix needed for equation 2.4.

Flows from or to state 0 are not considered. Flows from state 0 represent new recruits which for this thesis are dependent on the number of soldiers to be sent to SQI training. These flows are determined by the optimization model. On the other hand, flows to state i=0 represent attritions from the airborne community and are implied by the internal flows during the fiscal year and the stocks at the beginning of the fiscal year.

Since transitions among duty positions are restricted by career progression pattern and promotion policies, the resulting transition matrix has in each row only two or three nonzero elements.

Figure 2.1 represents a transition matrix for CMF 11, where nonzero elements are indicated by x.

DUTY POSITION		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
11B10P	1	X	X																X	X							
11B20P	2		X	X																X	X						
11B30P	3			X	X																X						
11B40P	4				X	X																X					
11B50P	5					X																	X				
11C10P	6						X	X																X	X		
11C20P	7							X	X																X	X	
11C30P	8								X	X																X	
11C40P	9					X				X																	X
11H10P	10										X	X															
11H20P	11											X	X														
11H30P	12												X	X													
11H40P	13					X								X													
11M10P	14														X	X											
11M20P	15															X	X										
11M30P	16																X	X									
11M40P	17					X												X									
11B10V	18	X	X																X	X							
11B20V	19		X	X																X	X						
11B30V	20			X	X																X	X					
11B40V	21				X																	X	X				
11B50V	22					X																	X				
11C10V	23						X	X																X	X		
11C20V	24							X	X																X	X	
11C30V	25								X	X																X	X
11C40V	26									X													X				X

Note: Nonzero elements are indicated by an X.

Figure 2.1 Transition Matrix for CMF 11

B. OPTIMIZATION MODEL

1. The Development of the Objective Function

The first task in the development of an optimization model is to determine its objective or goal. The objective of this optimization model is:

> to minimize the maximum percentage of shortage among all duty positions where there exists shortage. If it is possible to eliminate all shortages, then the goal is to create surpluses proportional to the future shortages that are expected to be created during the coming year.

This goal results in the fulfillment of the objectives which were stated in Section B of Chapter 1. Sending soldiers for training to fill the duty position where the maximum shortage exists or is expected to be created is preventing the creation of structured shortage. Structured shortage refers to the situation in which overstrengths exist for some duty positions and shortages exist for others.

The criterion of percent shortage was selected for the following reasons:

(a) Percentage of shortage is the only indicator of personnel readiness relative to trained personnel availability which is included in the unit status report figure 2.2, section 6c, that is submitted every month and from which is determined the readiness level of a unit. For more details see [Ref. 7].

(b) Percentage of shortage is used as a criterion of evaluation of the status of a unit with respect to readiness in AR 220-1 [Ref. 5]. See also [Ref. 8].

(c) Absolute numbers of shortage in any duty position may be misleading if used for comparison. For example, a shortage

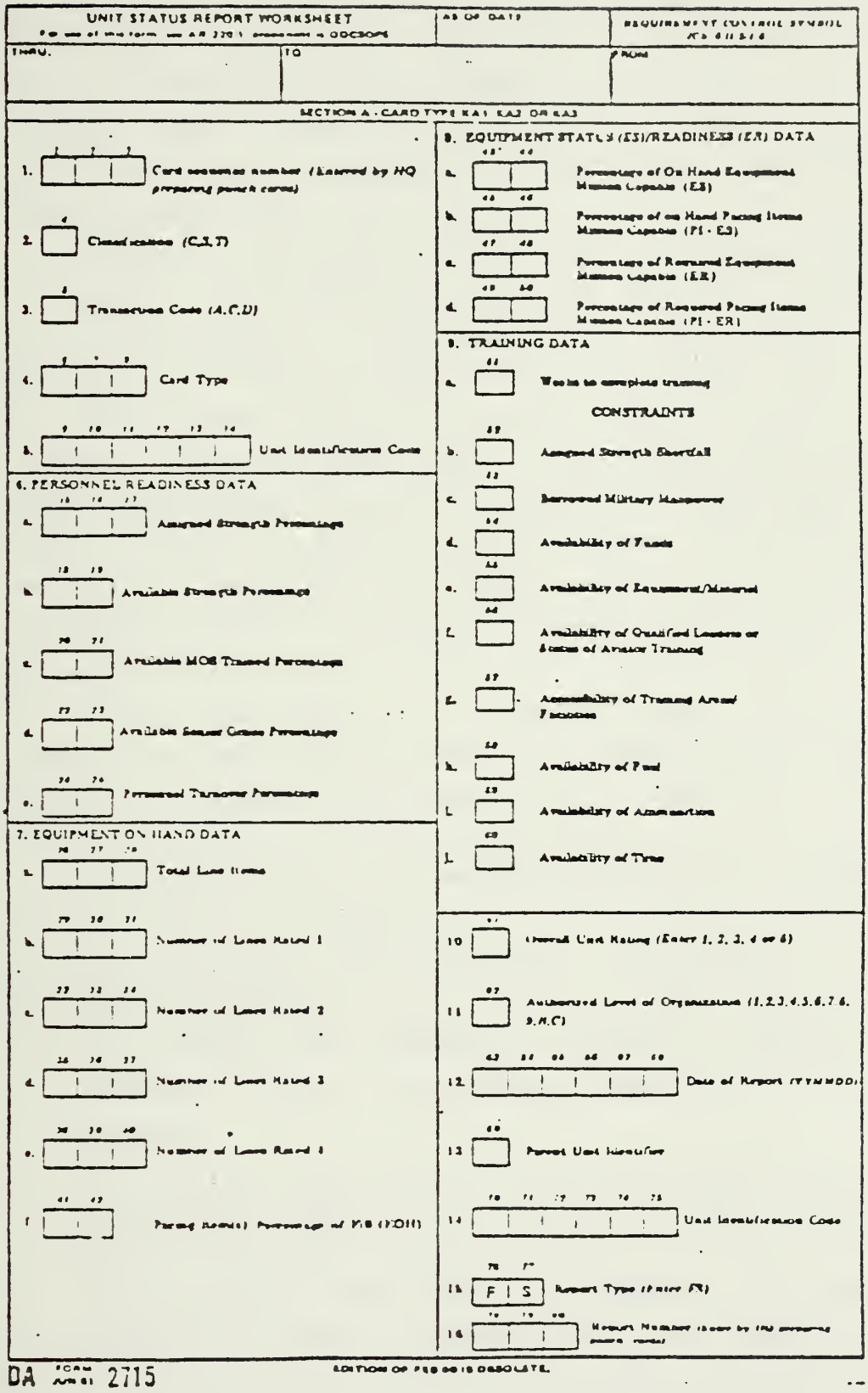
UNIT STATUS REPORT WORKSHEET
AS OF DATE
REQUIREMENT CONTROL SYMBOL
THRU
TO
FROM
SECTION A - CARD TYPE KA1 KA2 OR KA3
1. Card sequence number (Entered by HQ preparing punch cards)
2. Classification (C,S,T)
3. Transaction Code (A,C,D)
4. Card Type
5. Unit Identification Code
6. PERSONNEL READINESS DATA
a. Assigned Strength Percentage
b. Available Strength Percentage
c. Available MOS Trained Percentage
d. Available Senior Grades Percentage
e. Personnel Turnover Percentage
7. EQUIPMENT ON HAND DATA
a. Total Line Items
b. Number of Lines Rated 1
c. Number of Lines Rated 2
d. Number of Lines Rated 3
e. Number of Lines Rated 4
f. Pacing Item(s) Percentage of P/B (P2OH)
8. EQUIPMENT STATUS (ES)/READINESS (ER) DATA
a. Percentage of On Hand Equipment Mission Capable (ES)
b. Percentage of on Hand Pacing Items Mission Capable (PI - ES)
c. Percentage of Removed Equipment Mission Capable (ER)
d. Percentage of Removed Pacing Items Mission Capable (PI - ER)
9. TRAINING DATA
a. Weeks to complete training
CONSTRAINTS
b. Assigned Strength Shortfall
c. Borrowed Military Manpower
d. Availability of Funds
e. Availability of Equipment/Material
f. Availability of Qualified Leaders or Status of Armour Training
g. Accessibility of Training Areas/Facilities
h. Availability of Fuel
i. Availability of Ammunition
j. Availability of Time
10. Overall Unit Rating (Enter 1, 2, 3, 4 or 5)
11. Authorized Level of Organization (1,2,3,4,5,6,7,8,9,M,C)
12. Date of Report (YYMMDD)
13. Parent Unit Identifier
14. Unit Identification Code
15. F S Report Type (Enter FS)
16. Report Number (Assigned by HQ preparing punch cards)
DA FORM 2715
EDITION OF FEB 80 IS OBSOLETE.

Figure 2.2 Unit Status Report

of 10 people in a duty position where the authorized inventory is 15 has an entirely different meaning than in a case where the number of authorized personnel is 300.

(d) Common sense accepts that an inverse relationship does exist between the percentage of shortage in a unit and its ability to fulfill its goal.

Ideally, it would be desirable to have no shortage at all in any duty position, i.e. to be able to fill any newly created shortage. This would mean that all duty positions would be filled to their authorized levels, and there would exist enough surplus in the pool to cover future shortages. However budget and, in the short term, school capacity constraints do not always allow this goal to be realized. Hence a procedure must be found for determining the number of personnel that ought to be sent for training for each SQI so as to minimize shortage and enhance the operational readiness.

Note that even in the case where there is no shortage it is desirable to keep the percentage of existing surpluses of qualified personnel at a level that ensures effective coverage of future shortages.

The idea behind the solution method to be employed can be described as follows:

(a) calculate the percentage of shortage in each duty position;

(b) select for training a soldier for that duty position where the maximum percentage of shortage exists;

(c) compute the number of shortages after the above selection (using the proper training completion rate) and repeat steps (a) and (b);

(d) continue the above procedure as long as the budget and school capacity constraints permit.

Figure 2.3 shows a graphical representation of the objective function.

As can be seen from Figure 2.3 the objective function is not a continuous function and the usual optimization methods of linear or nonlinear programming become inappropriate. Therefore, the objective function was optimized by using marginal analysis, having as a goal the minimization of the maximum percentage of shortage.

The method of marginal analysis is based on the return that is obtained from the consumption of one unit of resource. For the purpose of this thesis the marginal return of sending one more person for training to cover shortage in some duty position is the reduction in the existing percentage of shortage in that duty position due to this decision.

It is crucial to decide whether existing shortage or predicted shortage is to be used, since these alternatives lead to different results. Using existing shortage has the characteristic of working with a known quantity. On the other hand, using predicted shortage to guide the training decisions is also appealing. The facts that the training period is quite short (three, eight, or twelve weeks) and that a shortage in jump status usually exists in a small number of duty positions and can be covered quickly by sending soldiers for training early in the fiscal year lead to the conclusion that it is more advantageous to first

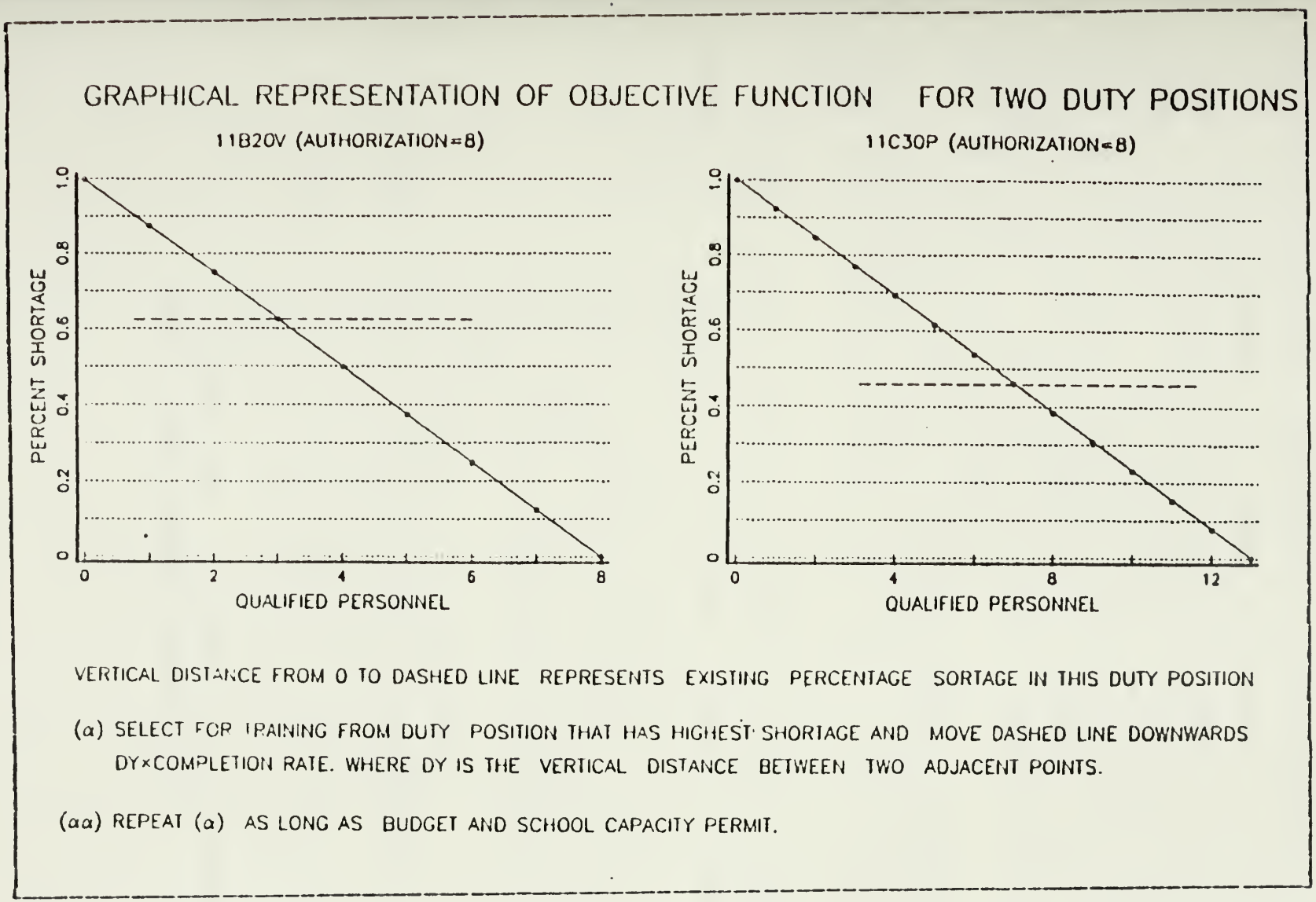

Figure 2.3 Graphical Representation of Objective Function

consider filling existing shortages. Then predicted shortages must be used to guide further training decisions which will create surpluses to cover shortages that otherwise would be created during the coming fiscal year. So in a case where two duty positions have the same authorizations and no current shortages, more soldiers will be sent for training for the duty position which has a larger loss rate (due to attrition, promotion and perhaps other causes), since it is expected that by the end of the fiscal year more shortages will exist in that duty position.

For the purpose of planning training requirements using the hindsight concept, the vector of predicted shortages in the airborne community for time t can be expressed as:

$$S(t) = A(t) - [N(t) + b \cdot U(t)] - b \cdot X(t) \quad \text{(eqn 2.5)}$$

where $A(t)$ = vector of authorized personnel levels at time t;

$N(t)$ = vector of current force levels that result after transitions of existing personnel at time period $(t-1,t)$, as generated by the Markov process described in the section A.5 of Chapter II;

b = the completion of training rate;

$U(t)$ = vector indicating number of personnel undergoing SQI training at time t; and

$X(t)$ = vector showing number of recruits to be entered for SQI training during time period $(t,t+1)$.

The symbol $X(t)$ represents the decision variable in this problem formulation.

In the same way expected shortage at time t+1 can be expressed when using the foresight concept as:

$$S(t+1) = A(t+1) - [N(t) + b \bullet U(t)] \bullet Q - b \bullet X(t) \quad \text{(eqn 2.6)}$$

where Q is the transition matrix described in section A.5 of this chapter.

This shortage is actually the difference between authorization and the sum of expected legacy after one year and the new graduates due to current training policy. The term legacy stands for forecasted inventories without new recruits. For more details see [Ref. 11].

It is assumed that there is no attrition for new graduates during the fiscal year they graduate, and no transitions to other duty positions.

For each duty position, these two relationships can be expressed as:

$$S_{ijk} = A_{ijk} - [N_{ijk} + b_k \bullet U_{ijk}] - b_k \bullet X_{ijk} \quad \text{(eqn 2.7)}$$

where i denotes the specific MOS,
j denotes the grade/skill level, and
k denotes the specific SQI.

For simplicity the time argument was omitted. The time argument for current or future shortage is the same as in equations 2.5 and 2.6 respectively.

The percentage of shortage for each duty position is defined as the quotient of S_{ijk} over A_{ijk}.

The symbol $X_{ijk}(t)$ denotes the decision variable chosen for this optimization model and represents the number of personnel with MOS i and SL j that should enter into SQI k training during time period (t,t+1). The interpretation of $b_k \bullet X_{ijk}$ is the number of qualified soldiers who will

graduate from SQI k training and enter into the airborne community occupying an MOS i and skill level j duty position.

For simplicity, the term $b_k \cdot U_{ijk}$ will be assumed to be included in the inventory N_{ijk}. This represents the number of future graduates from among soldiers currently being trained at school. This number can be estimated (using the proper completion rate) from given data and be counted in the current inventory since it does not depend on the training policy decisions for the upcoming fiscal year.

As discussed in the previous chapter, the authorized inventory levels are provided by the PERSACS document. The course completion rate of each type of SQI training is provided from empirical data. Force levels are provided by historical data for the initial time and are generated by the Markov process for succeeding times.

Thus, since the objective is to minimize the maximum percentage shortage among all duty positions as specified by MOS i, SI j, and SQI k, the objective of the problem can be mathematically expressed as:

$$\text{Minimize } [\text{Maximum}_{i,j,k} \ (S_{ijk} / A_{ijk})].$$

2. The Development of the Constraints

a. School Capacity Constraint

The total number of soldiers who enter SQI training cannot exceed the capacity L of the school during the corresponding time period (selected to be the fiscal year).

Mathematically, the school capacity constraint can be expressed as:

$$\sum_i \sum_j X_{ijk} \leq L_k \qquad \text{for each } k$$

where L_k represents the capacity of the school for the k-th SQI training, during a fiscal year.
For example, if 1000 soldiers can be accommodated in ranger training throughout the year by the United States Army Ranger School, then the total number of soldiers of all MOS's and skill/grade levels that can enter into that type of SQI training is limited to 1000. This limitation can be the result of living accommodations or any other factor which sets a physical restriction on the number of students that can be effectively trained.

b. Budget Constraint

The second factor that puts bounds on the decision variable is the budget level B which is allocated for SQI training in the airborne community.

A soldier is paid an additional amount of $83 per month while he is in training for any SQI. There are a few exceptions. For example, if a soldier is hospitalized for a long time period he does not receive this pay. If a soldier fails to complete the entire course of P training, he receives no payment. If a soldier fails to complete the entire course of V or S training, he is paid an amount proportional to the length of training completed. If times of failure are assumed to be uniformly distributed over the training period, the average time of failure is the midpoint

of the training period, and the cost is half the cost of training a soldier for the entire training period. Actual data indicate the average percent course completion to be approximately 0.17 instead of 0.50 before failure occurs. Thus the cost incurred is 0.17 times the total cost of the course for each individual who fails.

Mathematically, the budget constraint can be expressed as:

$$83 \cdot \sum_i \sum_j \left[\sum_k d_k \cdot b_k \cdot X_{ijk} + \sum_{k=2}^{3} d_k \cdot 0.17 \cdot (1-b_k) \cdot X_{ijk} \right] \leq B \qquad (2.8)$$

where

k = 2, 3 correspond to V and S respectively;

B = the budget which is allocated for SQI training;

d_k = the duration of the training period in months for SQI k; and

b_k = completion rate of training in SQI k.

The left hand side of inequality (2.8) represents the training cost for soldiers who either completed training or failed during the training period.

3. The Optimization Model

The mathematical representation of the optimization problem is:

$$\underset{X_{ijk}}{\text{minimize}} \left[\underset{i,j,k}{\text{maximum}} \left((A_{ijk} - N_{ijk} - b(k) \cdot X_{ijk}) / A_{ijk} \right) \right] \quad (2.9)$$

subject to:

$$\sum_i \sum_j X_{ijk} \leq L_k \qquad \text{for } k=1,2,3.$$

$$83 \cdot \sum_i \sum_j \left[\sum_k d_k \cdot b_k \cdot X_{ijk} + \sum_{k=2}^{3} d_k \cdot 0.17 \cdot (1-b_k) \cdot X_{ijk} \right] \leq B$$

$$X_{ijk} \geq 0.$$

Here the first constraint represents the school capacity restriction, the second is the budget restriction, and the third is the nonnegativity restriction of the decision variables.

C. MIXED MODEL

The forecasting and optimization models linked together form the mixed model.

Implementation of the mixed model begins by creating from historical data the transition matrices for each CMF using promotions within the airborne community and attritions out of the airborne community. Furthermore, vectors of authorized and qualified personnel must be extracted from tables of authorizations and inventories for each CMF.

Once the above data have been obtained, the forecasting model is used to predict legacies for the end of the fiscal

year. That is, inventories are forecast without new recruits. Then shortages for the beginning and end of the fiscal year under consideration are calculated. These shortages are calculated by subtracting inventories from authorizations. Finally the optimization model is used to determine the recruitment vector (training entrants times completion of training rate), which is used to generate the total inventory vector (sum of legacy and recruitment) for the beginning of the next fiscal year.

The above process is repeated for each fiscal year for which training requirements are desired.

III. EXECUTION OF THE MODEL

In this chapter the data required to create the input for the optimization and forecasting models, the methodology used in calculating the required parameters, as well as, the results of the mixed model will be discussed.

A. DISCUSSION OF DATA

The following data are required for the use of the model:

(a) available training budget,

(b) school capacity for each SQI,

(c) rate of completion of training for each SQI,

(d) cost of training one soldier for each SQI.

Also required for each CMF are the following vectors:

(a) the names of the duty positions included in the CMF, e.g. 11E10P,11B20P,11B30P,...,11C40V.

(b) authorizations for the beginning of each fiscal year for which training requirements are desired and for the beginning of the next fiscal year,

(c) inventories at the beginning of the first fiscal year for which training requirements are desired.

For each CMF these vectors must have the same length and the elements must be in the same order as those of the vector of names of duty positions in item (a) above. For consistency, for each CMF the first elements in each vector correspond to duty positions of SQI P followed by duty positions of SQI V. There is no SQI S in any CMF except CMF 18.

Finally for each CMF a transition matrix must be constructed with rows and columns also corresponding to the vector of names of duty positions.

1. Evaluation of Required Parameters

a. Budget

As discussed in Chapter II there is a specific budget that is allocated to the airborne community for hazardous duty pay for every soldier undergoing SQI training. In FY83, FY84, and FY85 the size of this training budget was 721, 1042, and 1042 man-years respectively. An enlisted airborne soldier currently receives $83 per month in jump pay. At this rate of pay, one man-year represents $996. There exists a separate budget called the operating budget which is allocated to the airborne community for hazardous duty pay of soldiers serving in the airborne community. This budget does not affect the optimization model since there is no connection between this budget and the training budget.

b. School Capacity

The school capacity for FY 1983 was:

SQI P: 20000 (50 classes, 400 soldiers per class)

SQI V: 1000 (5 classes, 200 soldiers per class)

SQI S: 1200 (12 classes, 100 soldiers per class)

For the purpose of the model it is assumed that the same school capacity is valid for FY's subsequent to FY83 as well.

c. Completion Rate

The course completion rate for each SQI is calculated by dividing the total number of graduates by the number of soldiers who had originally entered training for that SQI. These rates for FY83 were calculated by the Army Training Requirements and Resource System (see [Ref. 14].) and found to be:

0.81 for parachutists (P),

0.64 for rangers (V), and

0.55 for specialists (S).

These rates were recomputed for SQI's P, V, and S, using data received from the airborne community for FY82 and FY83 classes, and were found to be 0.79, 0.68, and 0.43, respectively. These recomputed rates are used in the remainder of this thesis.

d. Cost of Training

The training cost is the amount required to train a soldier as P, V, or S. This amount depends on the length of the training period since a trainee is paid hazardous duty pay during training. This cost also depends on the completion rate since only people who graduate receive full payments as discussed in section B.2.b of Chapter II. Therefore the cost was calculated as follows:

for parachutists : $83 \cdot 0.79 \cdot 9/13 = \$45$

for rangers : $83 \cdot [0.68+0.17 \cdot (1-0.68)] \cdot 24/13 = \$113$

for specialists : $83 \cdot [0.43+0.17 \cdot (1-0.43)] \cdot 36/13 = \$121.$

where 83 = monthly payment in dollars of a soldier undergoing SQI training

0.17 = percent course completion of soldiers who fail

0.79 = completion rate for SQI P training

0.68 = completion rate for SQI V training

0.43 = completion rate for SQI S training

and

9/13 = duration of training in months for SQI P

24/13 = duration of training in months for SQI V and

36/13 = duration of training in months for SQI S.

Here one week = 12/52 = 3/13 months was used.

For budget allocation purposes one could include in the cost of V and S training the cost of first training the soldiers as parachutists. The validity of this depends

on the fraction of V and S recruits who have already attended P training. Since this fraction is unknown, this cost is not included in the cost of V and S training for this thesis.

2. Creation of Required Vectors

To create the required vectors, authorizations for FY84, FY85, and FY86, and inventories for the beginning of FY84 were used. These data were received from MILPERCEN. For CMF 18 which was newly created during 1983 it was assumed that authorizations and inventories for each duty position equaled the summation of corresponding numbers for the duty positions from which each position was composed. For example, according to the information paper received from MILPERCEN [Ref. 13], soldiers from 11B30S and 12B30S could transfer to duty position 18B30S. Therefore, authorizations and inventories for duty position 18B30S were obtained as the sum of authorizations and inventories respectively for duty positions 11B30S and 12B30S. The inventories so created for CMF 18 are probably higher than the actual ones, since transfer to the new CMF was voluntary. Because of unavailability of actual data, the numbers used were estimates.

The vectors of duty positions are needed for easy interpretation of the final output. These vectors were created using all the duty positions that appear in the authorization or inventory tables and belong to the career progression pattern of a CMF. The first positions of these vectors always correspond to parachutists, the next to rangers and the last to specialists. Furthermore, for consistency, the duty positions were arranged within each SQI in alphabetical order according to their MOS designation and in increasing order of skill level (e.g. in CMF 11, 11C10P is before 11C20P and after 11B50P). The duty position

00Z50 tc which soldiers with SL5 from all CMF's may be promoted is not considered in this thesis, due to the unavailability of data on promotions to this duty position. Furthermore, such a model would become very complicated since there would be a connection among all CMF's and the transition matrices would no longer be independent of each other. In that case it would be necessary to create one enormous matrix for the airborne community. The simplification of not considering the training requirements for the MOS/SI combination 00Z50 actually does not significantly affect the solution of the training problem. This is true since C0Z50 is the last grade in the hierarchy and there always exist trained personnel of SL 5 in some CMF to cover vacancies without the need for training.

After the creation of the vector of duty positions for each CMF, the corresponding vectors of authorizations and inventories were extracted from the tables of authorizations and inventories. Inventories include soldiers that are being trained currently, at the time of planning. For illustration, the names of duty positions, authorizations and inventories for CMF 11 are presented in Table 2. Appendix B contains all such Tables for all CMF's.

The inventories such as those shown in Table 2 were obtained by adding the number of trained personnel that serve in the 82nd airborne division, and the number of qualified soldiers who serve in other units or exist in the pool. These data were obtained from MILPERCEN. The soldiers undergoing SQI training at the beginning of FY 1984 were not available and were not included in the inventories.

3. Creation of Transition Matrices

Flow data (promotions, attritions, and other transitions among duty positions) for FY83 as well as inventories for the beginning of FY83 were obtained from the

TABLE 2

Authorizations and Inventories for CMF 11

Duty position	Authorization FY84	FY85	FY86	Inventory FY84
11B10P	4306	4285	4285	6222
11B20P	676	679	679	1444
11B30P	621	637	637	1065
11B40P	249	246	246	816
11B50P	137	137	137	348
11C10P	573	573	573	1163
11C20P	224	224	224	214
11C30P	14	15	15	120
11C40P	47	47	47	121
11H10P	523	361	361	646
11H20P	87	60	60	233
11H30P	92	64	64	147
11H40P	22	13	13	61
11M10P	0	0	0	7
11M20P	0	0	0	2
11M30P	0	0	0	4
11M40P	0	0	0	3
11B10V	58	59	59	248
11B20V	142	141	141	315
11B30V	220	234	234	293
11B40V	83	84	84	207
11B50V	31	34	34	67
11C10V	0	0	0	17
11C20V	6	6	6	19
11C30V	6	6	6	15
11C40V	0	0	0	9

Defense Manpower Data Center (DMDC) in Monterey, CA. These data are summarized in Tables 3 through 7 .

Table 3 shows the existing inventories by SQI and SL at the beginning of FY 1983.

Table 4 shows the number of soldiers who were promoted from one SL to the next higher one for each SQI in FY 1983.

Table 5 shows by SQI/SL the number of soldiers who left the army during FY 1983.

Table 6 shows by SQI/SL the number of soldiers who lost their SQI qualification during FY 1983.

TABLE 3

Inventories by SQI/SL for FY83

	P	V	S
SL1:	14614	314	276
SL2:	5142	377	448
SL3:	3933	375	722
SL4:	2411	252	813
SL5:	984	138	801

TABLE 4

Promotions by SQI/SL for FY83

From	To	P	V	S
SL1	SL2:	2493	46	120
SL2	SL3:	1105	103	201
SL3	SL4:	576	54	157
SL4	SL5:	261	40	101

Table 7 shows by SL the number of soldiers who changed their SQI qualification during FY 1983 with or without a promotion to the next higher SL. Changes from or to S are not considered because such changes are not possible after FY83.

Table 8 shows by SL inventories of P and V in FY83 from which transitions to V and P, respectively, can occur. For example, MOS 11H is not encountered with SQI V, so duty positions belonging to MOS 11H were not included in the inventory under P in Table 8 . The inventories in Table 8 are needed in the computation of transition rates from P to V and vice-versa.

TABLE 5

Losses from the Army by SQI/SL in FY83

	P	V	S
SL1:	3693	73	46
SL2:	817	81	43
SL3:	184	18	31
SL4:	131	14	45
SL5:	149	14	114

TABLE 6

Other Losses from the Airborne Community by SQI/SL in FY83

	P	V	S
SL1:	777	12	4
SL2:	489	48	11
SL3:	434	39	16
SL4:	280	20	26
SL5:	95	12	23

Table 9 shows the promction rates from one SL to the next higher one. These rates are the quotients of the numbers in Table 4 and the corresponding inventories shcwn in Table 3 .

It was assumed that promotion rates from one SL to the next higher one were the same for all MOS's within each SQI. However promotion rates were calculated separately for P, V, and S due to the fact that graduates of different SQI training have different lengths of service in their pay grade, consequently their rates of promotion differ significantly.

TABLE 7

Number of Transitions from P to V and V to P in FY83

	P to V		V to P	
	with promotion	without promotion	with promotion	without promotion
SI1:	41	164	3	1
SI2:	13	21	3	4
SI3:	1	19	6	8
SI4:	0	6	0	6
SI5:	0	2	0	2

TABLE 8

Inventories of P and V in FY83 from which Transitions to V and P Can Occur

	P	V
SL1:	9446	314
SL2:	2404	377
SL3:	2183	375
SL4:	1645	252
SL5:	613	138

Transitions among SQI's involving a change in MOS with or without a change in CMF were negligible (29 soldiers in total) and were not included in the forecasting model. The only remaining possible transitions are from P to V and visa-versa. Any transition from or to S since FY1984 would imply a change in CMF and is no longer possible. Also changes between P and V are possible only in some CMF's. The inventories by SL where such transitions may occur are shown

TABLE 9

Promotion Rates from one SL to the next by SQI/SL

From	To	P	V	S
SL1	SL2:	.171	.146	.435
SL2	SL3:	.215	.273	.449
SL3	SL4:	.146	.144	.217
SL4	SL5:	.108	.159	.124
SL5	00Z50:	.072	.072	.072

Note: There was no available data on promotions from SL5 to 00Z50. Rates in the last row were taken from Army-wide promotion rates for FY83 15

in Table 8. Inventories of V's are equal to the total number of V's since any V can change to a P.

The transition rates from P to V and from V to P with or without promotion were calculated by dividing the flows of soldiers from one SQI to the other (from Table 7) by the corresponding inventories of duty positions in which these transitions originate (quantities in Table 8). Table 10 shows these rates.

Attrition rates for each SQI/SL combination were calculated as the quotient of the sum of the quantities in Tables 5 and 6 over the quantities in Table 3. These rates are shown in Table 11.

Staying rates (that is, proportion of soldiers who make no transition during the FY) for each SQI/SL combination were calculated by subtracting from 1.0 the sum of the promotion rate, attrition rate, and other transition rates to other duty positions. Table 12 shows the proportion of people who stay in the same SL for each SQI, for duty positions where there are no transitions to a different SQI. For example, since soldiers in duty position 11H30P cannot

TABLE 10

Transition Rates from P to V, and from V to P

FROM	TO	P to V w/prom.	P to V w/o prom.	V to P w/prom.	V to P w/o prom.
SL1	SL2:	.004	.017	.010	.003
SL2	SL3:	.006	.009	.008	.011
SL3	SL4:	.000	.009	.016	.021
SL4	SL5:	.000	.004	.000	.024
SL5	:	.000	.003	.000	.014

TABLE 11

Attrition Rates by SQI/SL

	P	V	S
SL1:	.306	.271	.181
SL2:	.254	.342	.121
SL3:	.157	.152	.065
SL4:	.170	.135	.087
SL5:	.248	.188	.171

change to SQI V, the staying rate in this duty position (from Table 12) is .697 .

Table 13 shows the staying rates in those duty positions for which transitions to different SQI's are possible. For example, since soldiers in duty position 11B20P can change to SQI V, the staying rate in this duty position (from Table 13) is .516 .

Tables 12 and 13 show the same staying rates for S. This is due to the fact that no MOS occurs both in CMF 18 and in another CMF.

TABLE 12

Staying Rates by SQI/SL when there are no Transitions among SQI's

	P	V	S
SL1:	.523	.583	.384
SL2:	.531	.385	.430
SL3:	.697	.704	.718
SL4:	.722	.706	.789
SL5:	.680	.740	.757

TABLE 13

Staying Rates by SQI/SL when there are Transitions among SQI's

	P	V	S
SL1:	.502	.570	.384
SL2:	.516	.366	.430
SL3:	.688	.667	.718
SL4:	.718	.682	.789
SL5:	.677	.726	.757

The transition matrix for each CMF was generated using the above rates, for the duty positions belonging to each CMF. Figure 3.1 shows the transition matrix for CMF 12. The element (1,1) shows that the fraction of soldiers who stay in duty position 12B10P is 0.501. The element (1,2) shows that the fraction of soldiers who are promoted

0.502	0.171	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.017	0.004	0	0
0	0.516	0.215	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.009	0.006	0
0	0	0.688	0.146	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.009	0
0	0	0	0.718	0	0	0	0	0	0	0	0	0	0	0	0.108	0	0	0	0.004
0	0	0	0	0.523	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0.697	0.146	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0.722	0	0	0	0	0	0	0	0	0.108	0	0	0	0
0	0	0	0	0	0	0	0.523	0.171	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0.531	0.215	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0.697	0.146	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0.722	0	0	0	0	0.108	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0.523	0.171	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0.531	0.215	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0.697	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.722	0.108	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.68	0	0	0	0
0.003	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.57	0.146	0	0
0	0.011	0.008	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.366	0.273	0
0	0	0.021	0.016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.667	0.144
0	0	0	0.024	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.682

Figure 3.1 Transition Matrix for CMF 12

from this duty position to duty position 12B20P is 0.171. Appendix C contains all the transition matrices for all CMF's. Due to large size of CMF's 63, 71, and 91 instead of the entire transition matrices only the nonzero elements are shown (Figures C.16, C.19, and C.25).

B. DISCUSSION OF RESULTS OF THE MIXED MODEL

The model was implemented on the IBM 3033 machine at the Naval Postgraduate School using the programming language APL. Execution of the model is started by typing the word "AIRBORNE". The program interactively asks for values of the parameters and for input of the required data. An example of a terminal session is shown in appendix D. The function[1] "AIRBORNE" is a driver program which invokes the forecasting and optimization subroutines (FORCAST, ARIS, GROUP, SCHOOL) and prints the results by fiscal year and CMF. The functions "ARIS" and "GROUP" implement the optimization model. The program for the forecasting model consists of the function "FORCAST". The function "SCHOOL" produces the required school capacity and budget in order to achieve a specific percentage coverage of authorizations. The functions "DATA" and "VALUE" are also invoked by the "AIRBORNE" program and help in the entry of required data in the model. The function "MATRIX", invoked by the user, constructs the required transition matrices. The function "DATAINPUT" also invoked by the user is a driver program which invokes the functions "DAT1" and "DAT2" and can be used for the creation of required vectors of data. Finally, the function "DATAMAN" also invoked by the user can be used for manipulation (adding elements, deleting elements, reassigning values to an element) of existing

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[1]In APL the word "function" means a program performing a specific task.

vectors of data. All the above programs are listed in Appendix E.

Appendix D contains a description of the model, as well as the output from a run of the model. After user input, the results by fiscal year follow. First, a summary of results is printed showing the remaining budget and school capacity as well as the maximum percentage shortage for each SQI. These values could help the user in deciding on a training policy. For example, shortages of 0.1744 and -0.516 for specialists (S) and parachutists (P), respectively, mean that there is at least one duty position in specialists for which the remaining shortage after training will be 17.44% of authorization, and that there is at least one duty position in parachutists for which the surplus will be 51.6% of authorization. All the other S and P duty positions have smaller percent shortages and larger percent surpluses respectively. Therefore, the school capacity is insufficient for specialists and larger than needed for parachutists. After the summary, detailed results follow by CMF.

For each CMF a table of results is produced whose number of rows equals the number of duty positions in the CMF, and the number of columns equals seven. The first column contains the names of the duty positions. The next two columns contain the authorizations for the beginning and end of the fiscal year under consideration. The fourth and fifth columns indicate the net requirements (i.e. shortages) for the beginning and end of the fiscal year needed to cover authorizations up to 100%. The sixth column is the value of the decision variable showing the number of soldiers who should enter training. The seventh column is the recruitment that is expected for each duty position using the training policy of column six (i.e. column seven equals completion rate times column six).

At the beginning of the session the user is asked to enter the number of fiscal years (1 or 2) for which results are desired. Depending on this answer the user has the following options:

(a) In case of entering 1:

(i) to run the program for succeding fiscal years keeping authorizations constant;

(ii) to rerun the program for the same fiscal year using different parameters, e.g. larger completion rates.

(b) In case of entering 2 he has only the option to rerun the program for these 2 fiscal years using different parameters, e.g. different budget or school capacity.

Running the program for two fiscal years requires authorizations for the beginning of the first and second fiscal years as well as for the end of the second fiscal year.

Examining the output (Appendix D) that refers to CMF 11 one observes a large allocation of 4269 positions from the school capacity for P for the duty position 11B10P. This drives its expected shortage from 27% to a surplus of 51.6%. For the duty position 11C20P 13 soldiers were first sent for training to cover existing shortage in the beginning of the fiscal year and then, after covering all existing shortages, the model started covering predicted shortages at the end of FY 84 to finally drive all the predicted shortages to 0 and furthermore to create surpluses of at least 51.6% of authorizations for each duty position with SQI P. The user can cause the model to ignore current shortage and deal only with future shortage by equating authorizations of the first year to inventories. In that case the model will not find any existing shortage and will start covering expected future shortages immediately.

C. ANALYSIS OF REQUIRED PARAMETERS

1. Budget

The available budget for training is a critical item in the optimization model as it is one of the constraints that prevents the model from recruiting an unlimited number of personnel.

A small budget, which does not permit the school capacity to be fully used, results in a decrease of training allocations to the SQI in which the corresponding duty positions have lower percent shortages. For example, if the maximum percent shortage in P's is 0.50 and in V's is 0.20, and to bring the shortage in P's to the level of V's requires the use of the whole budget that implies that no one would be sent for V training.

2. School Capacity

The school capacity is the only factor that causes the model to lead to unequal maximum percent shortages for P, V, and S. This can happen in a case where school capacity for one SQI has been exhausted while there still exists available budget for training. This occurs when the school capacities for the three SQI's are not proportional to the existing or expected shortages in the respective duty positions and can lead to the creation of structured shortage which is an undesirable situation.

3. Cost of Training

The cost of training one soldier in any SQI is related to the length of training period and inversely related to the completion rates. Increase in training costs results in decrease of the decision variable vector (i.e. the bigger the cost of training the less the number of people who can be trained under a fixed budget). Increase

in training costs can also affect the allocation among SQI's through the budget constraint as discussed previously.

4. Course Completion Rate

A decrease in the cource completion rate for some SQI results in bigger allocations to that SQI training.

A change in the completion rate can also affect the decision variable through the constraints. For example, as the completion rate in V decreases, the training becomes more expensive and bigger allocations to V training are required to get a specific number of V graduates.

D. CHANGE OF POLICY ANALYSIS

A change of policy implies changes in one of the following parameters:

(1) Promotion rate;

(2) attrition rate; or

(3) transition rates among SQI's.

Therefore, a change of policy implies changes in the transition matrices and as a result changes in the predicted inventories.

Change in the promotion rate can apply to a specific SQI and/or SL. For example, the promotion rate for parachutists with skill level 2 may be changed to insure that parachutists with SL 2 are promoted at a rate 0.30 instead of the previous 0.215. Assuming that attrition rates and transition rates among SQI's remain the same the staying rate for SQI P and SL 2 personnel is changed from 0.516 to 0.431 for the case when transitions from P to V are possible and changed to 0.446 when transitions from P to V cannot occur.

Changes to the attrition rate or other transition rates would create similar changes in the staying rates.

To allow such changes in the forecasting model the transition matrices have to be changed. This is effected by creating new transition matrices after making the correction in transition rates inside the function "MATRIX" which requires knowledge of the APL programming language.

IV. SUMMARY AND FUTURE CONSIDERATIONS

A. SUMMARY

This thesis formulates a model which forecasts future force levels and determines the number of soldiers to be sent for training within the airborne community. The goal of the optimization model is the minimization of the maximum percentage shortage of personnel relative to authorization. The formulated model consists of two submodels. The first submodel is a forecasting model in which future inventories are estimated using Markov chain theory while the second submodel is an optimization model which employs the strategy of marginal analysis. The model formulated and discussed in this thesis can successfully handle trends in shifting manpower demands. Also, this model is a planning aid for manpower decision-makers in answering "what if" questions relative to changes in budget, school capacity, cost of training, and training school completion rates, attrition and promotion rates.

In summary, the user's work consists of the following three steps:

(i) Creation of required vectors of names of duty positions, authorizations, and inventories. This can be done by typing the word "DATAINPUT", which is an interactive program that facilitates the creation of these vectors.

(ii) Construction of transition matrices. For CMF 11 the user should type "M11←MATRIX P011", where P011 is the vector of names of duty positions and M11 is the name of the newly created transition matrix for CMF 11.

(iii) Run the forecasting and optimization models by typing the word "AIRBORNE".

(iv) Changes in the data may be made if necessary using the function "DATAMAN". For example, to change the vector of names of duty positions for CMF 12 the user should type "P012←DATAMAN".

B. FUTURE CONSIDERATIONS

Large data requirements can be considered as a disadvantage in the use of the model. Derivation of the required data in proper format using a computer program to extract vectors of authorizations, inventories, and names of duty positions from existing computer files of authorizations and inventories would result in a big reduction of the user's work.

Potential areas which remain to be investigated are:

(i) computerized data derivation: that is, creation of a computer program to extract vectors of names, authorizations and inventories from existing files of authorizations and inventories for each CMF,

(ii) validation of the model: empirical data of a fiscal year (other than FY83 on which the construction of the model is based) should be used to determine its effectiveness in personnel prediction and optimization.

(iii) data verification: The fraction of V and S recruits who currently hold the P qualification should be determined so that the proper changes can be made in the training cost computation. This fraction also has an effect on completion rates and utilization of school capacity.

APPENDIX A
CAREER PROGRESSION PATTERNS

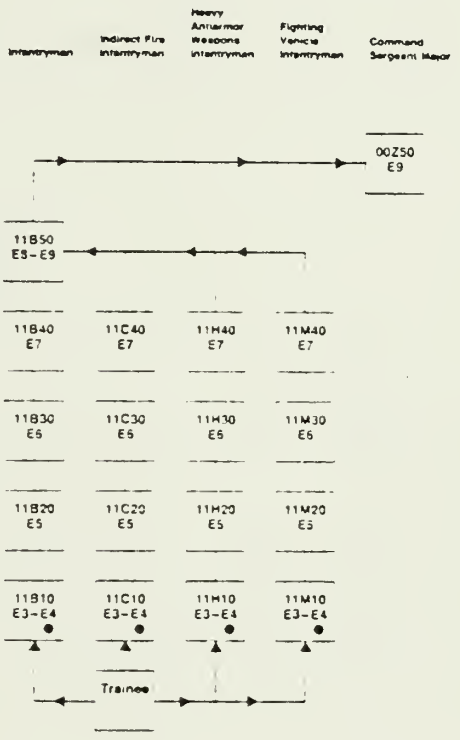


Figure A.1 Career Progression Pattern for CMF 11

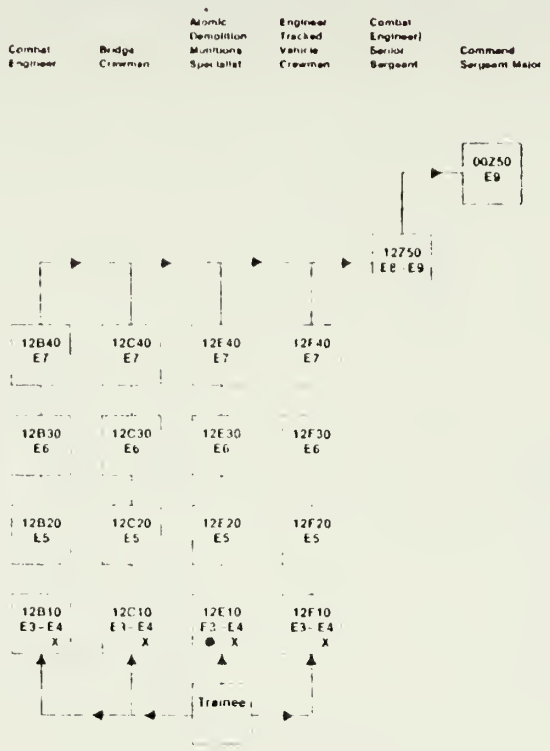


Figure A.2 Career Progression Pattern for CMF 12

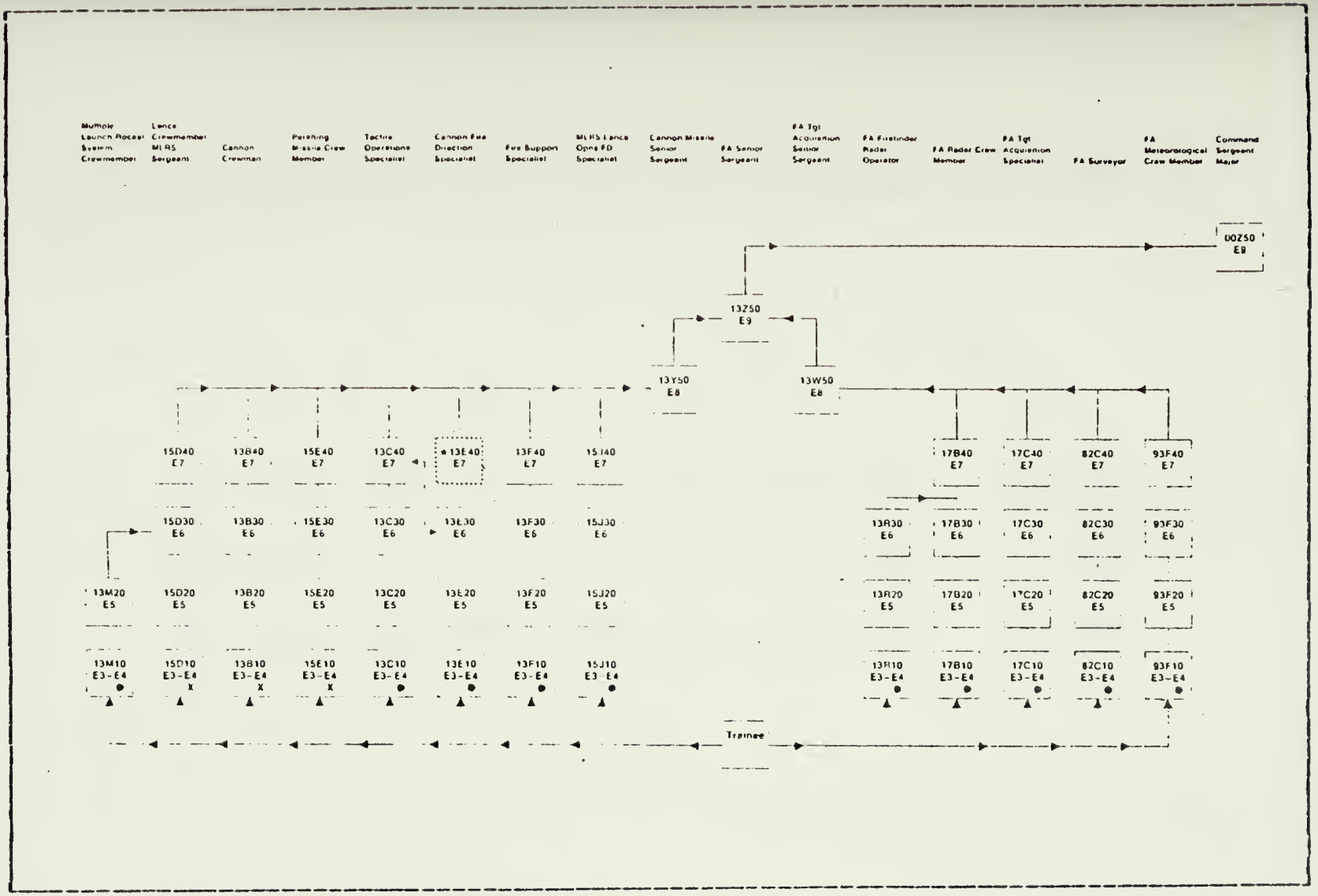


Figure A.3 Career Progression Pattern for CMF 13

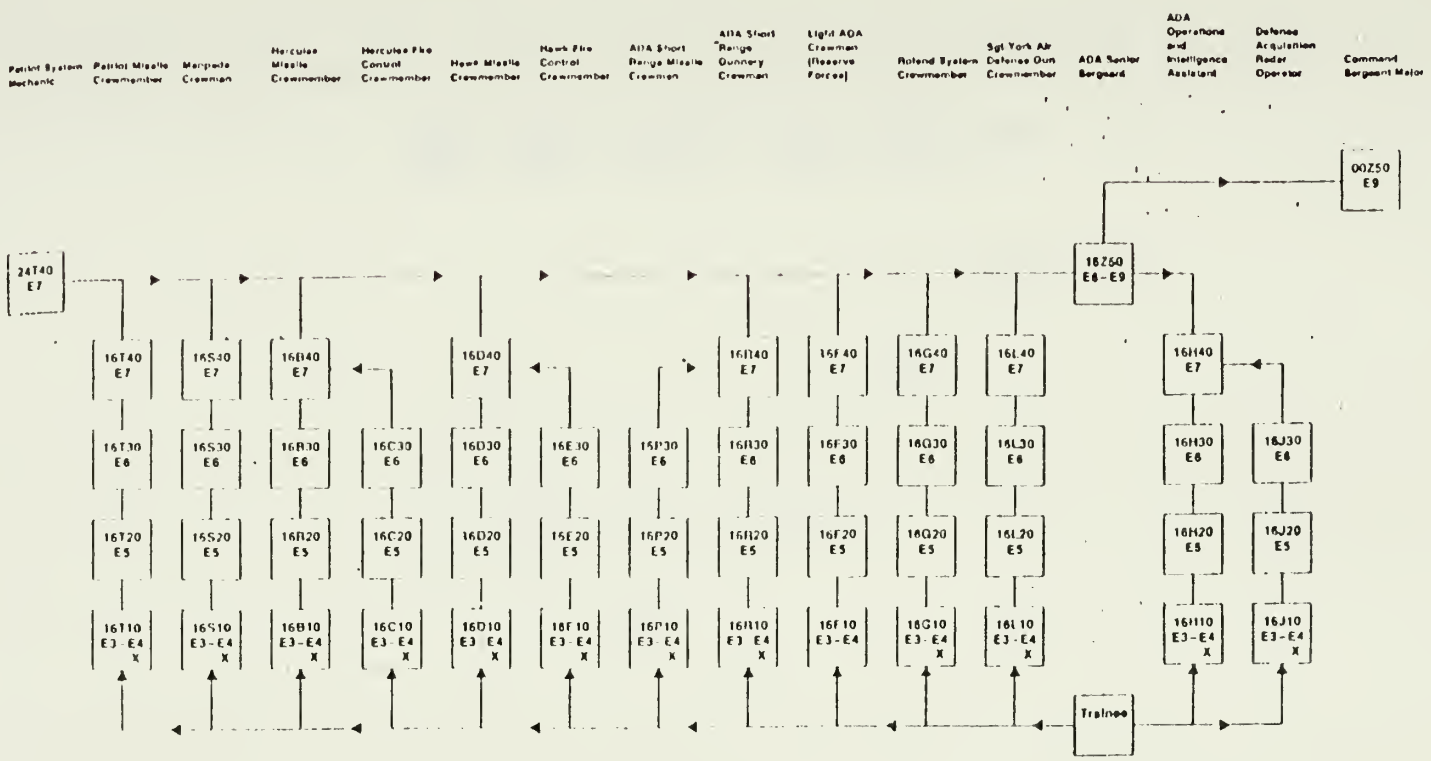


Figure A.4 Career Progression Pattern for CMF 16

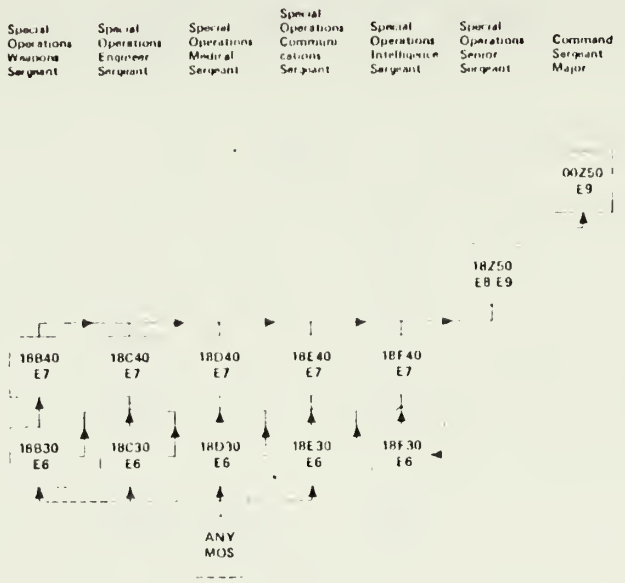


Figure A.5 Career Progression Pattern for CMF 18

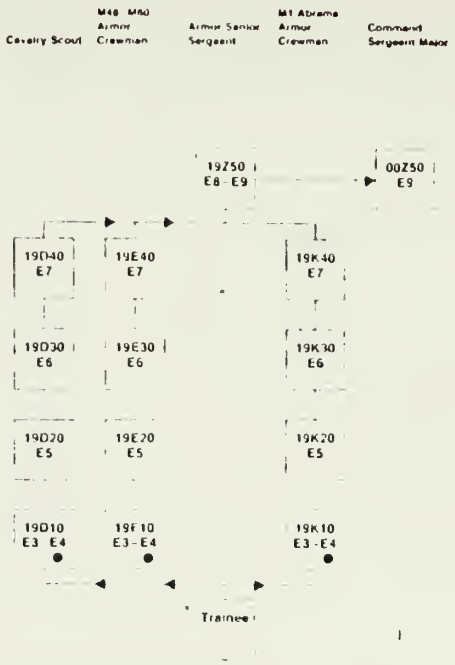


Figure A.6 Career Progression Pattern for CMF 19

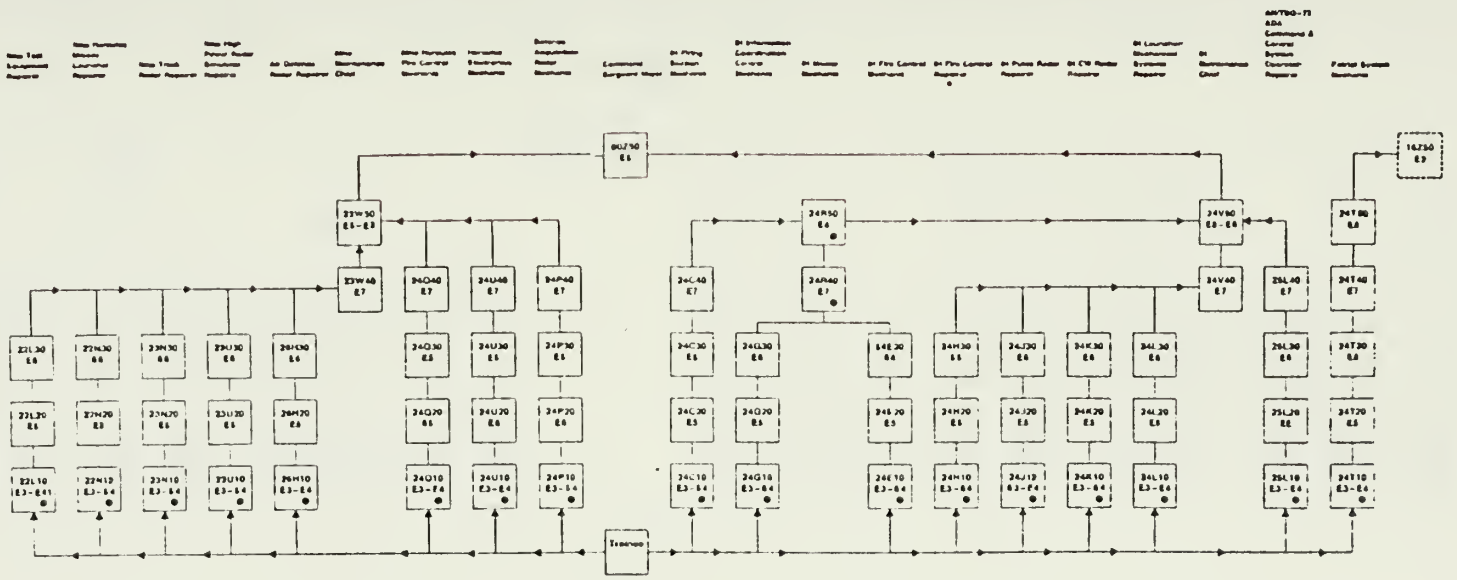


Figure A.7 Career Progression Pattern for CMF 23

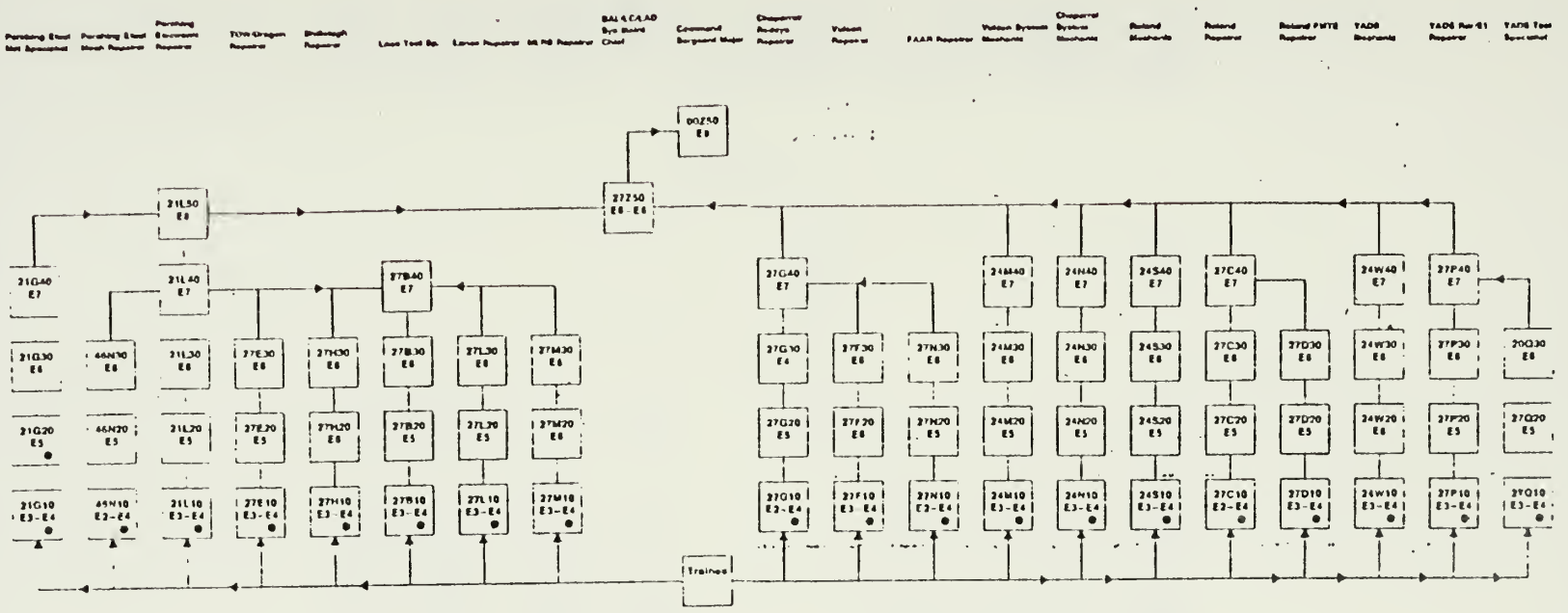


Figure A.8 Career Progression Pattern for CMF 27

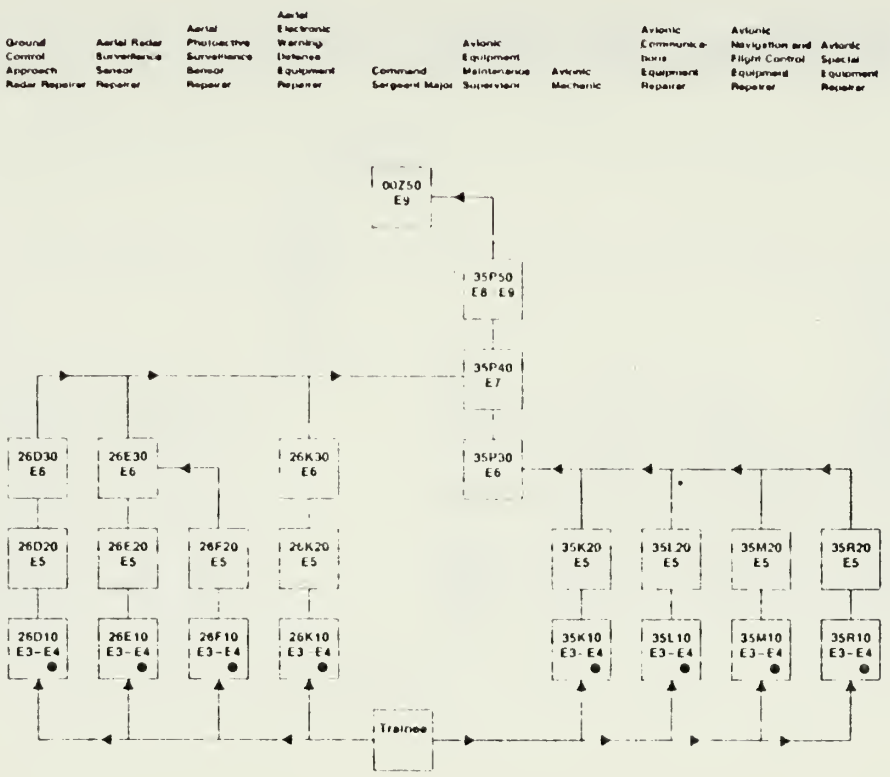


Figure A.9 Career Progression Pattern for CMF 28

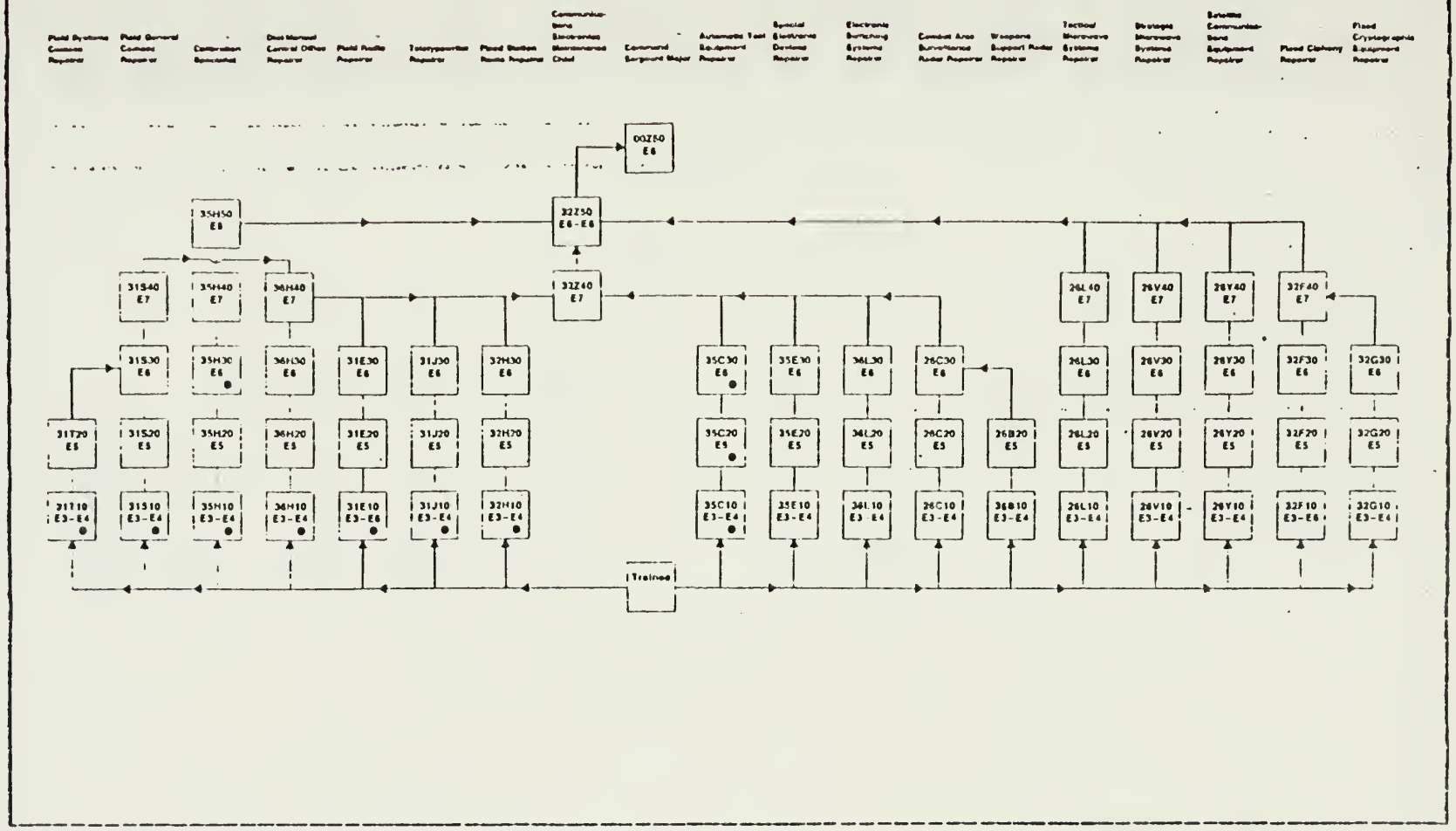


Figure A.10 Career Progression Pattern for CMF 29

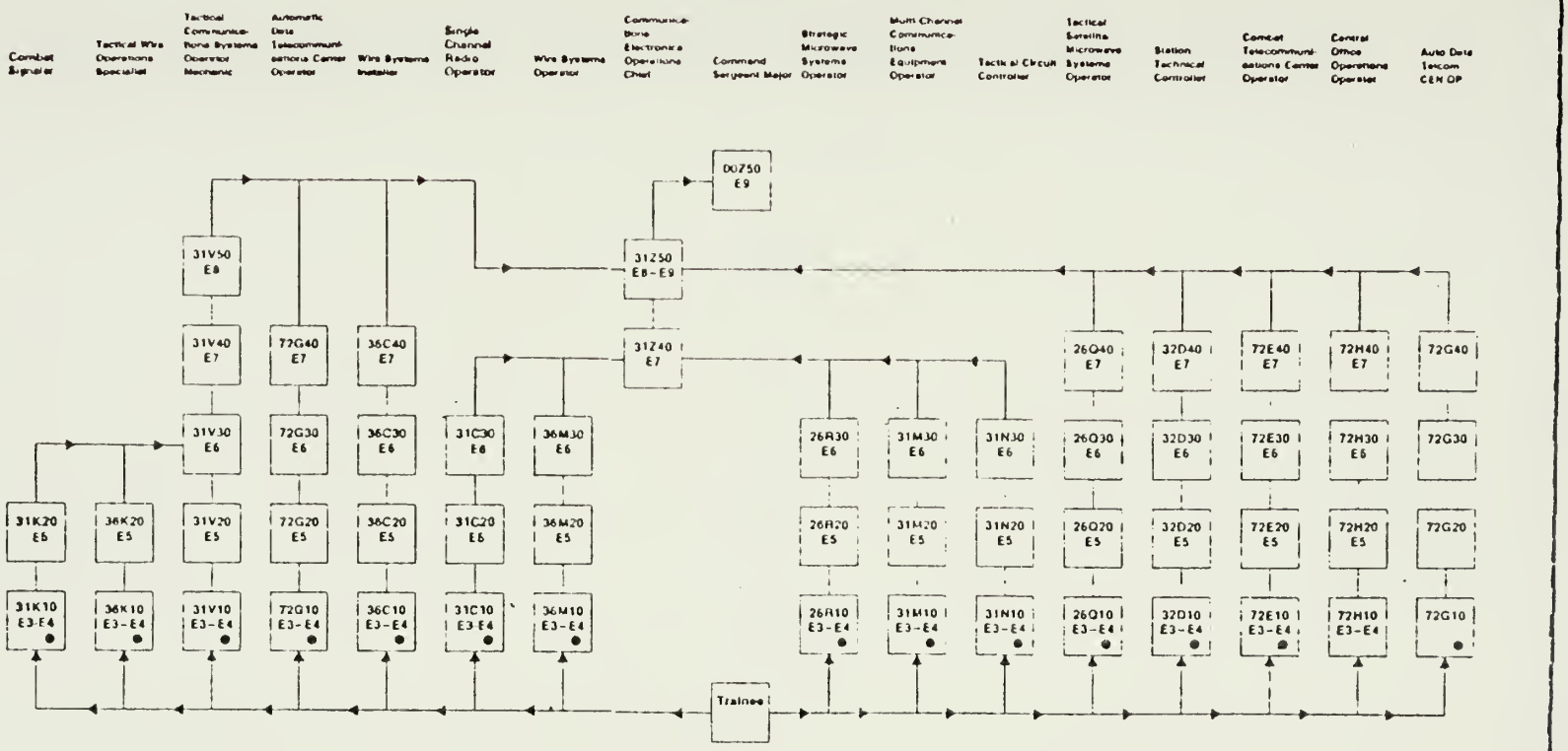


Figure A.11 Career Progression Pattern for CMF 31

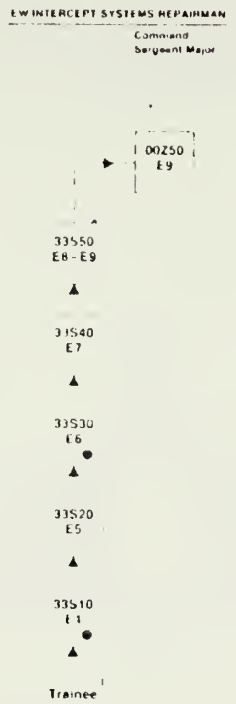


Figure A.12 Career Progression Pattern for CMF 33

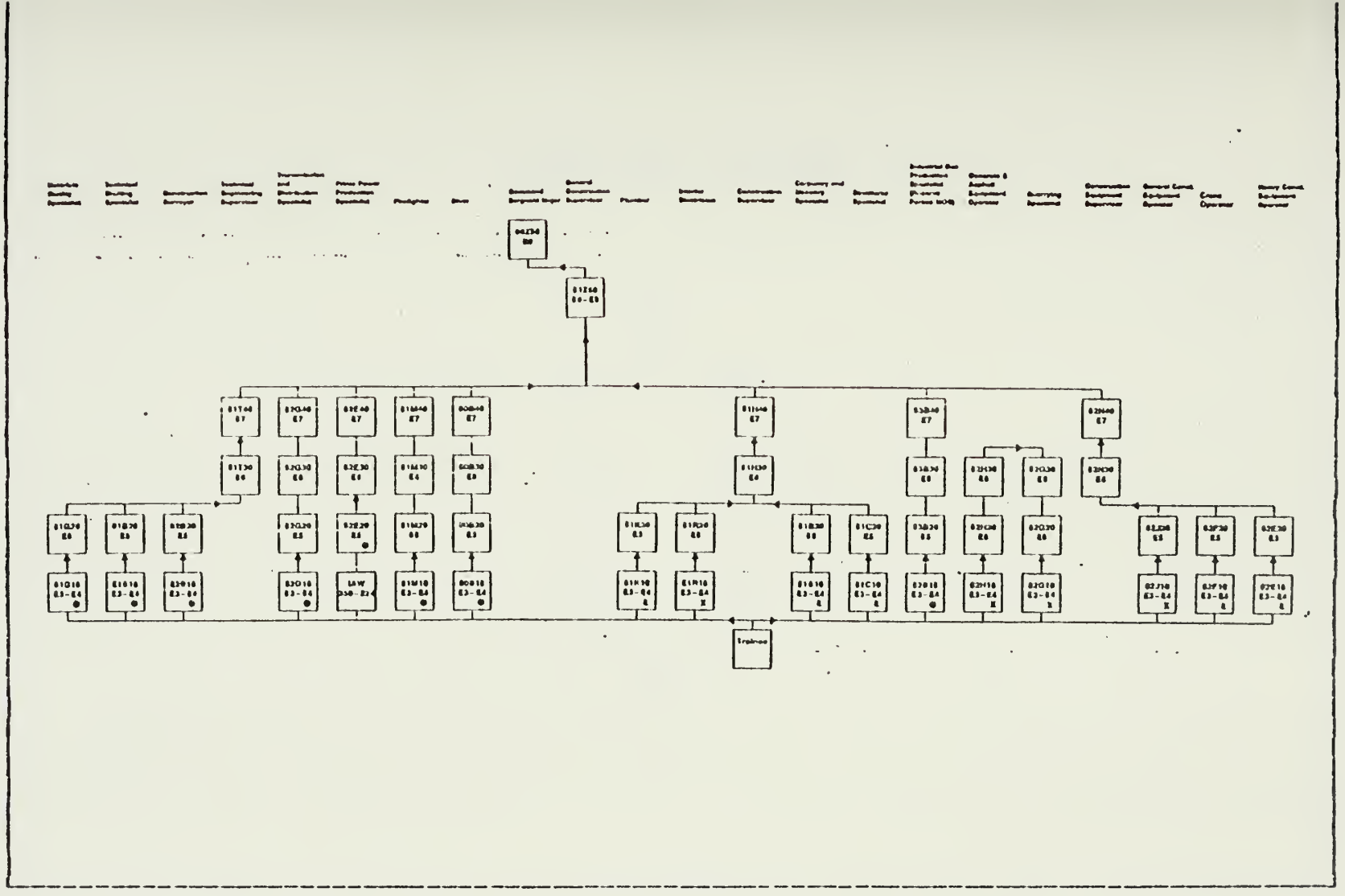


Figure A.13 Career Progression Pattern for CMF 51

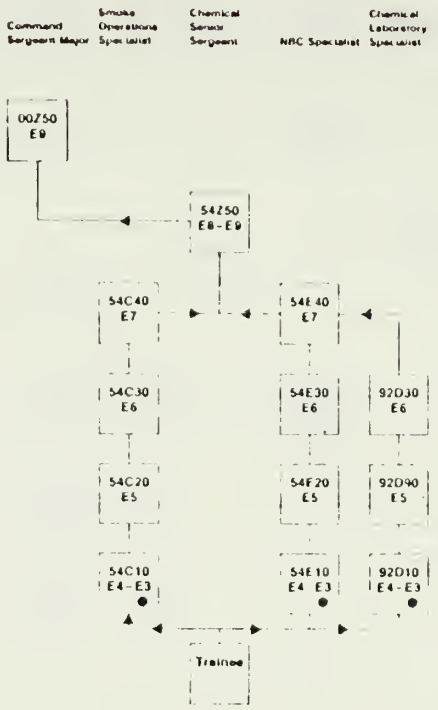


Figure A.14 Career Progression Pattern for CMF 54

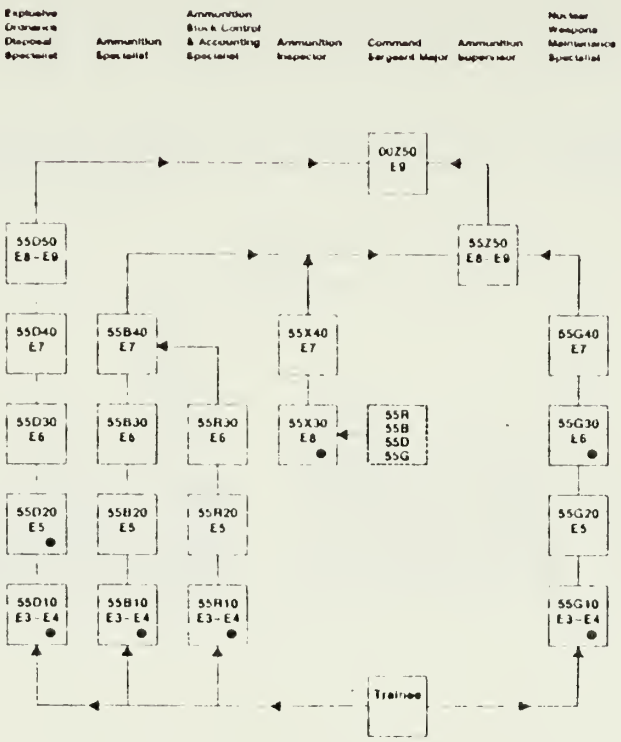


Figure A.15 Career Progression Pattern for CMF 55

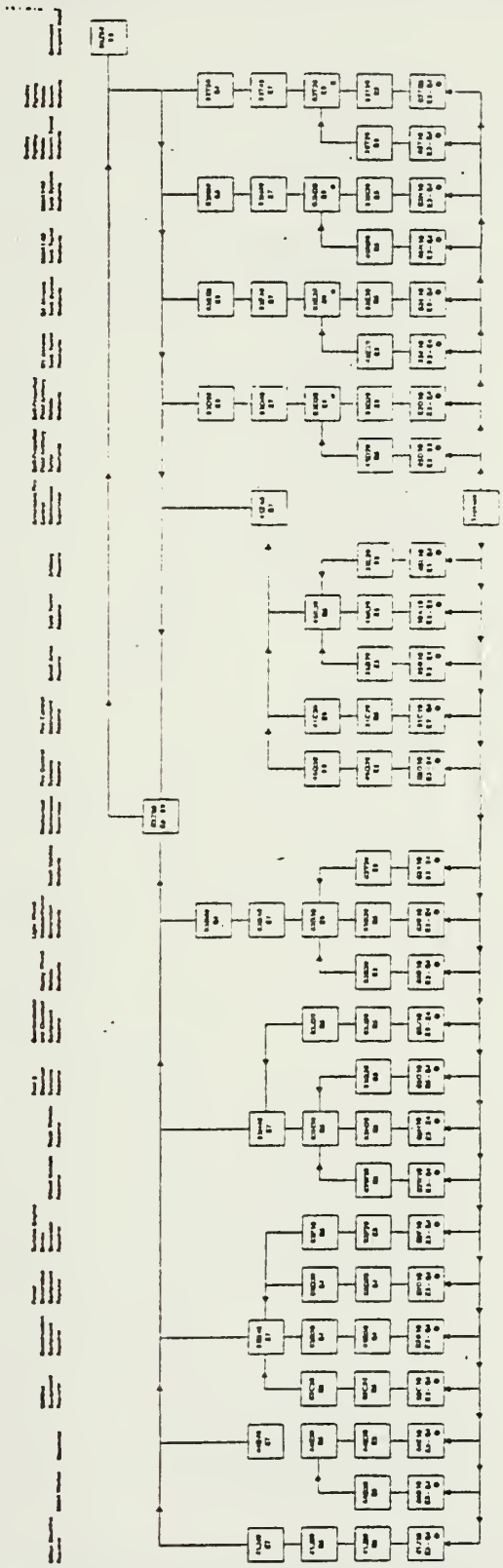


Figure A.16 Career Progression Pattern for CMF 63

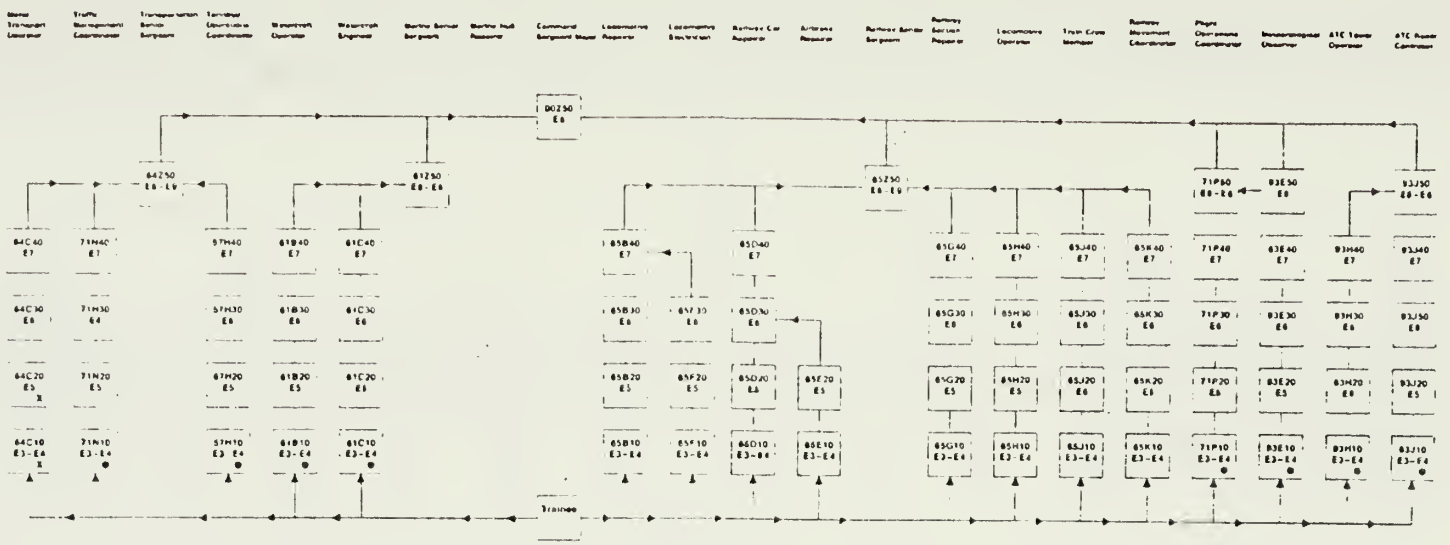


Figure A.17 Career Progression Pattern for CMF 64

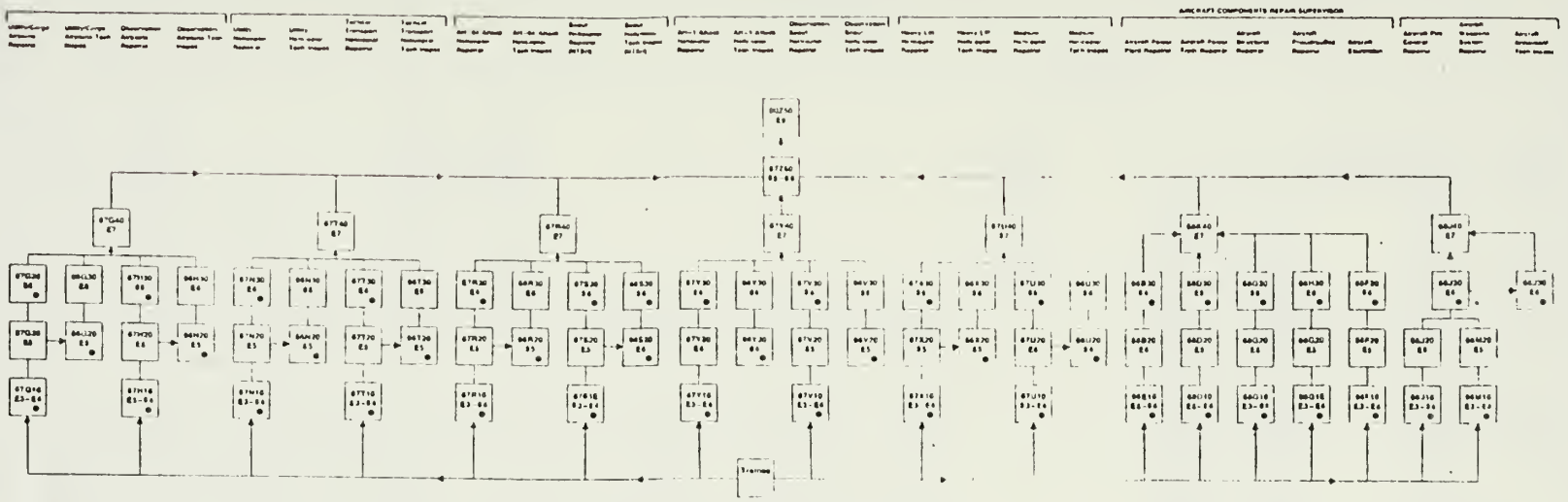


Figure A.18 Career Progression Pattern for CMF 67

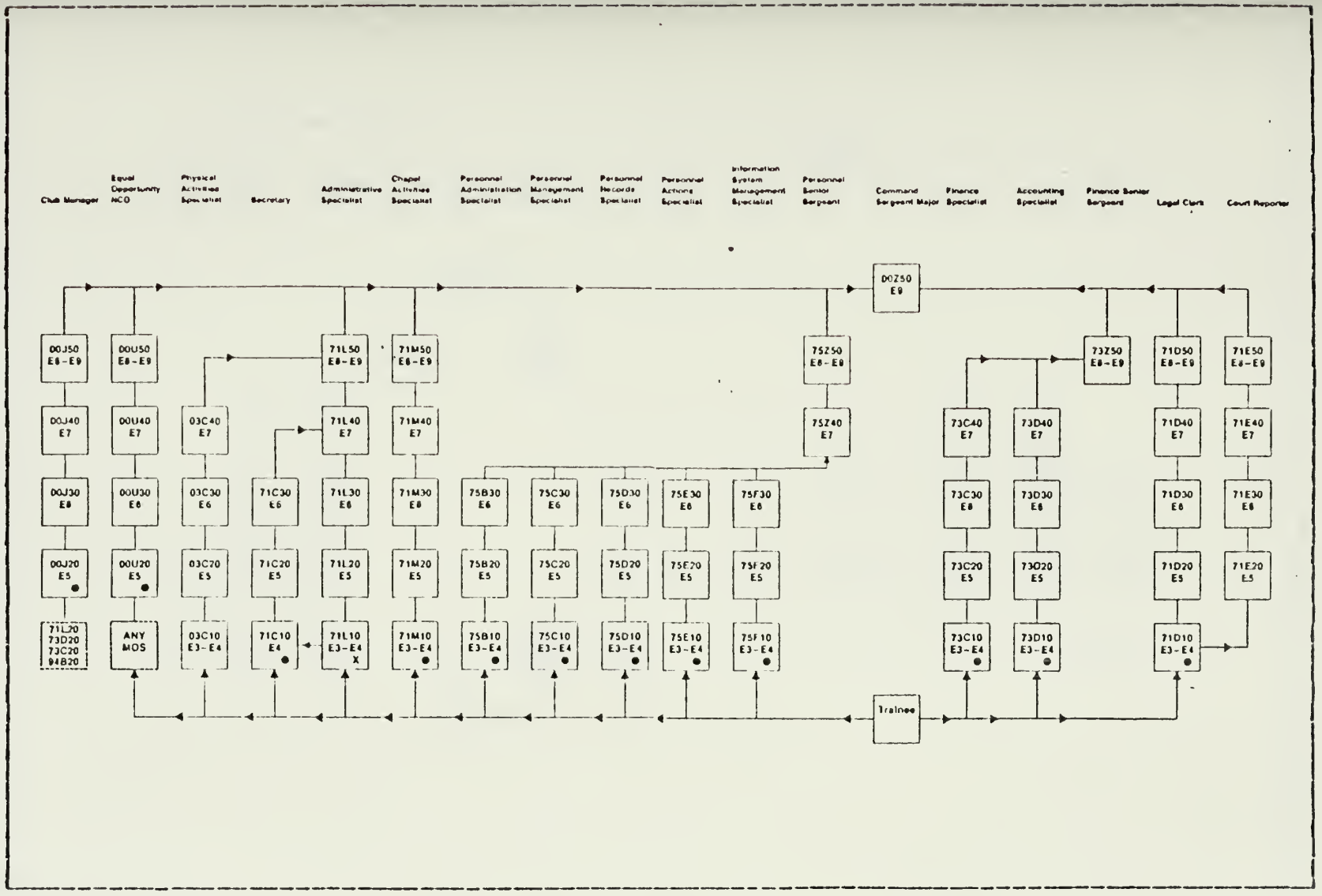


Figure A.19 Career Progression Pattern for CMF 71

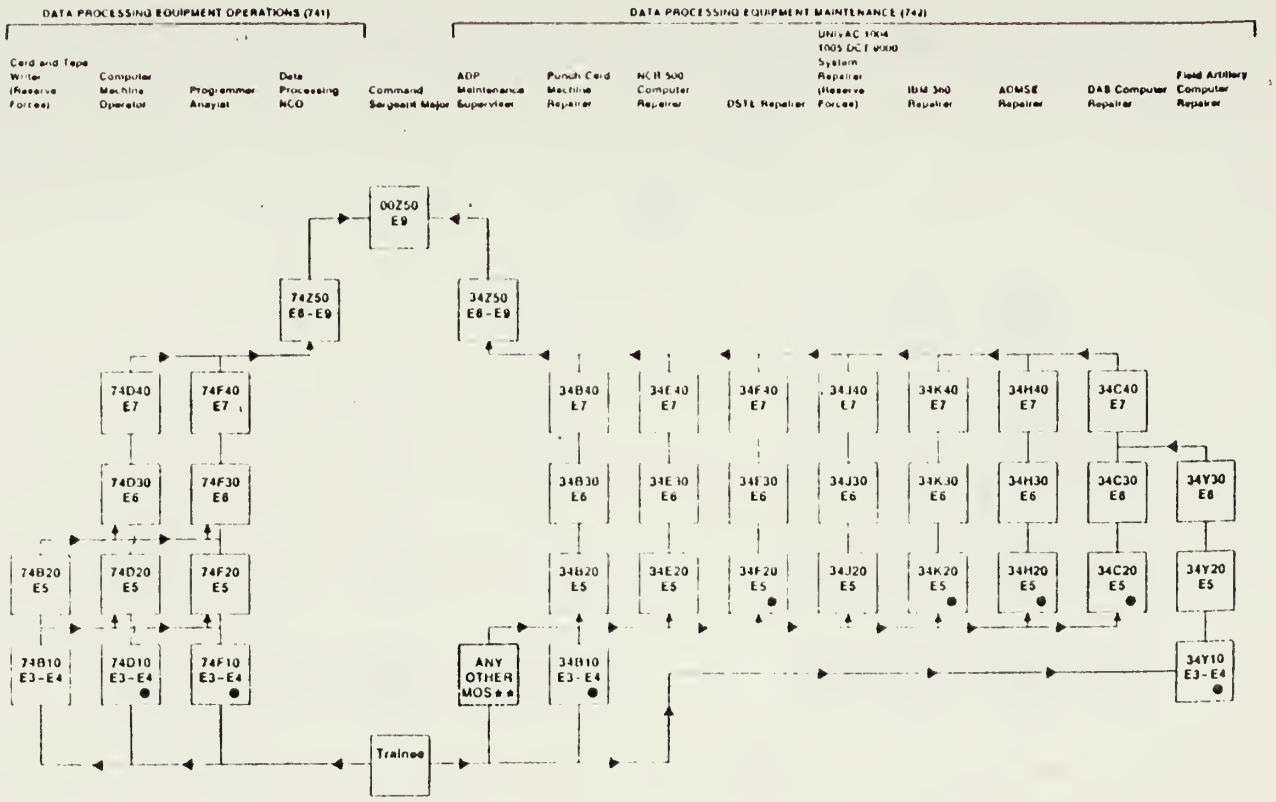


Figure A.20 Career Progression Pattern for CMF 74

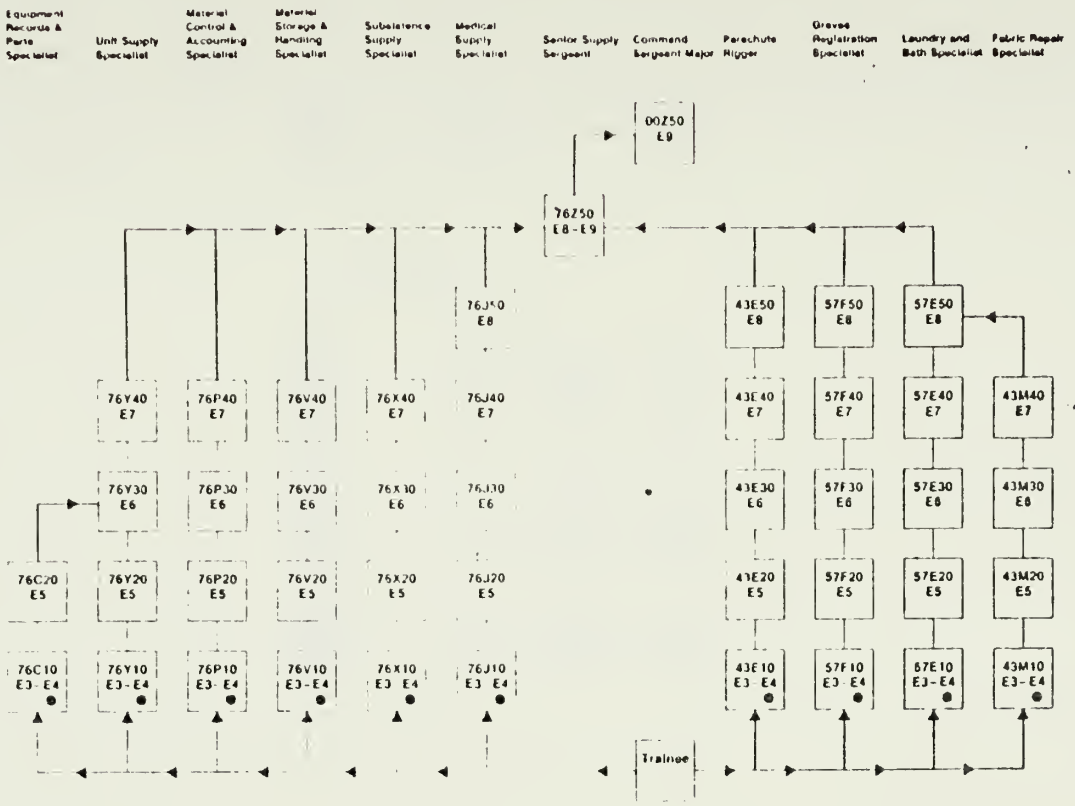


Figure A.21 Career Progression Pattern for CMF 76

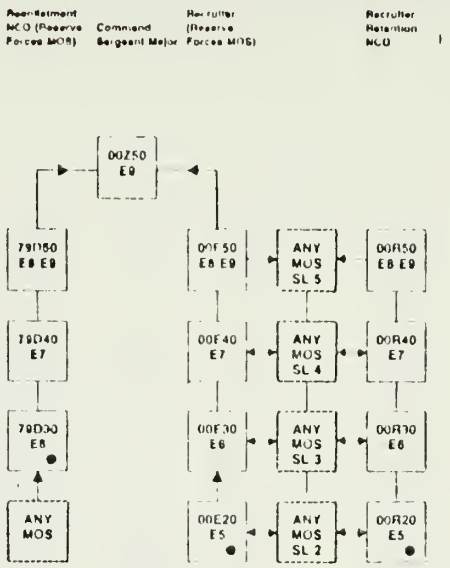


Figure A.22 Career Progressiom Pattern for CMF 79

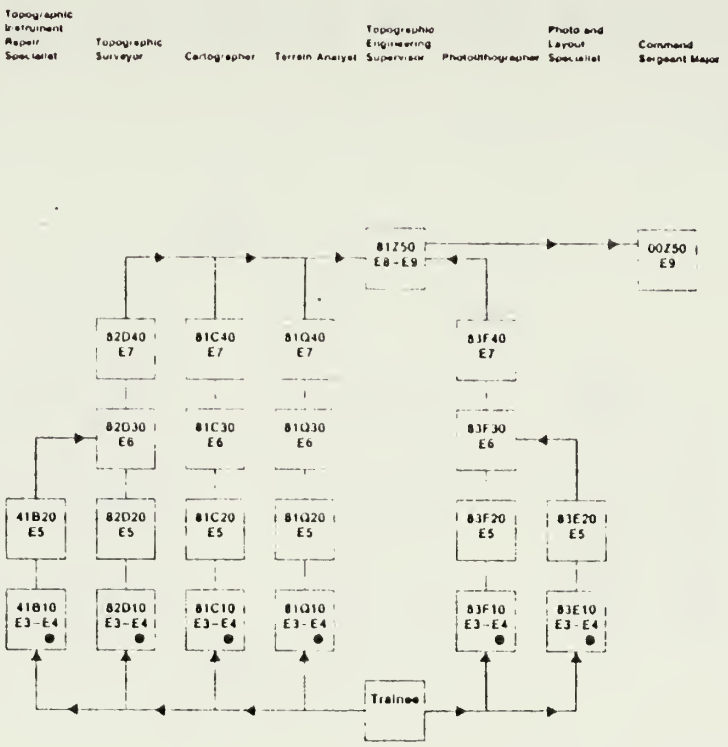


Figure A.23 Career Progression Pattern for CMF 81

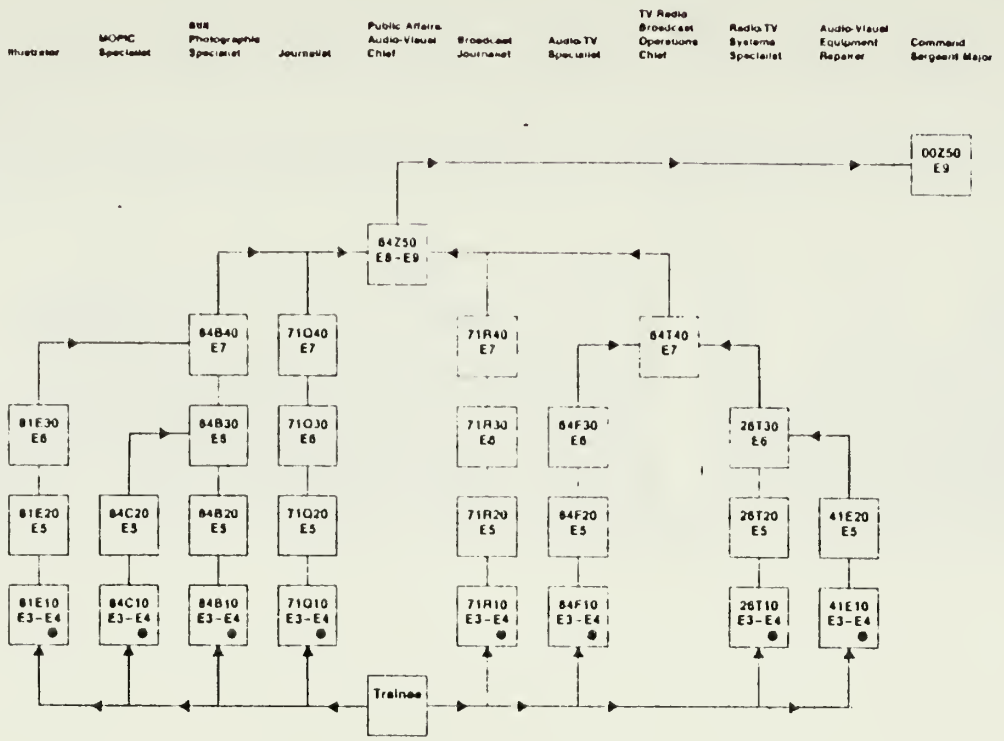


Figure A.24 Career Progressiom Pattern for CMF 84

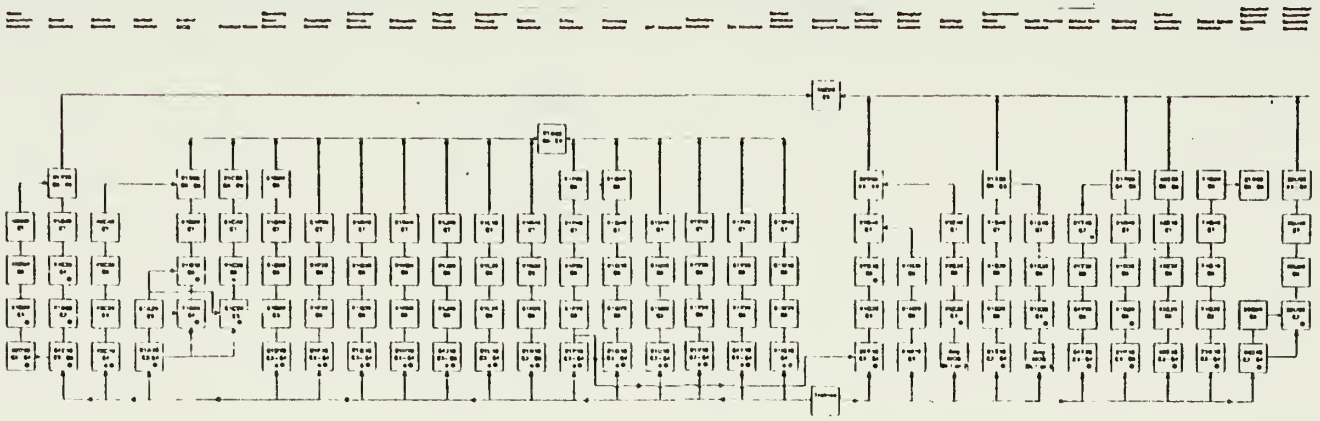


Figure A.25 Career Progression Pattern for CMF 91

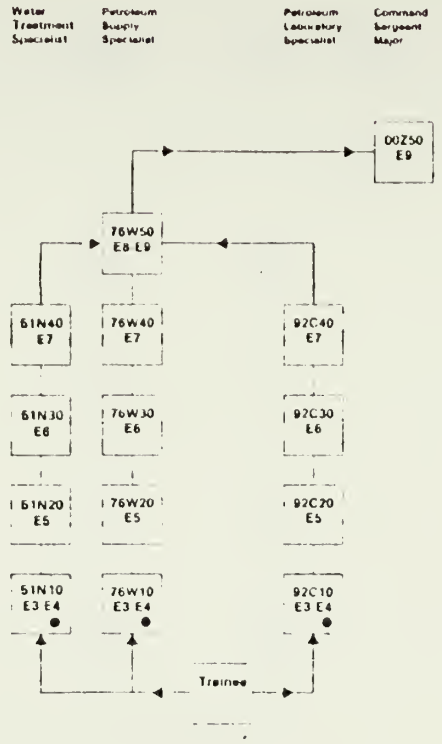


Figure A.26 Career Progression Pattern for CMF 92

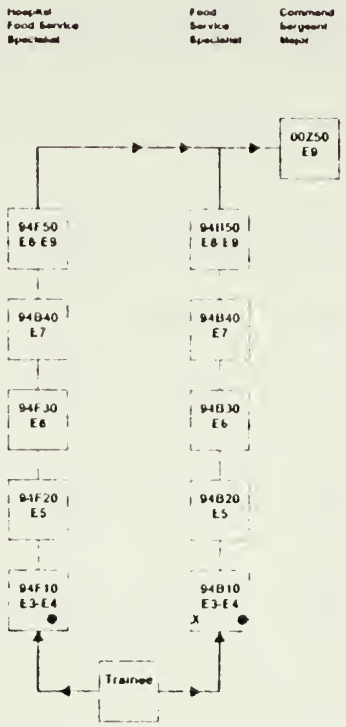


Figure A.27 Career Progression Pattern for CMF 94

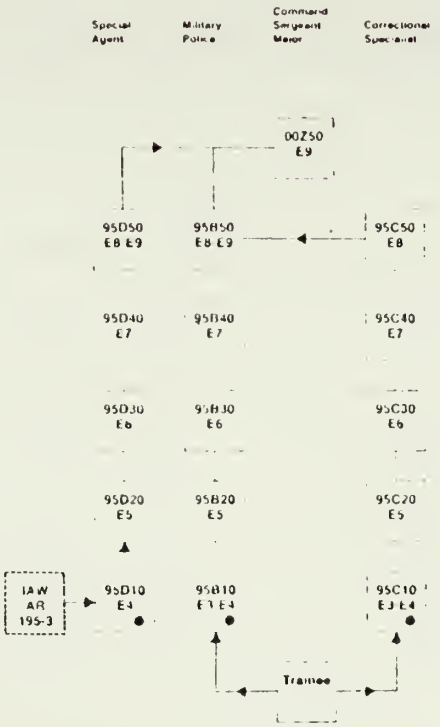


Figure A.28 Career Progression Pattern for CMF 95

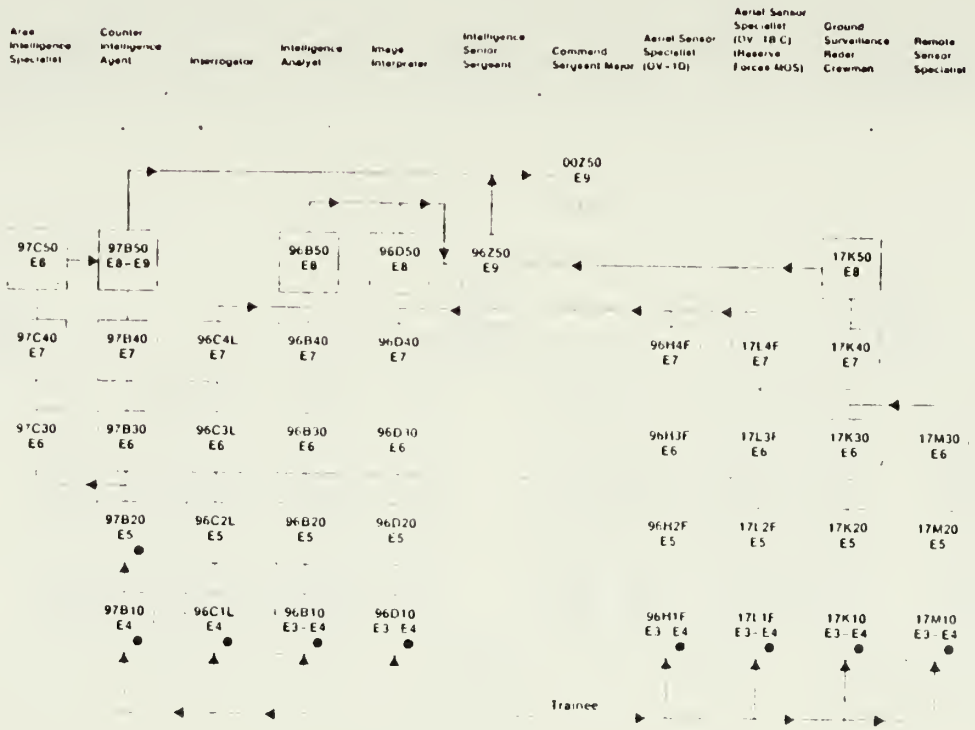


Figure A.29 Career Progression Pattern for CMF 96

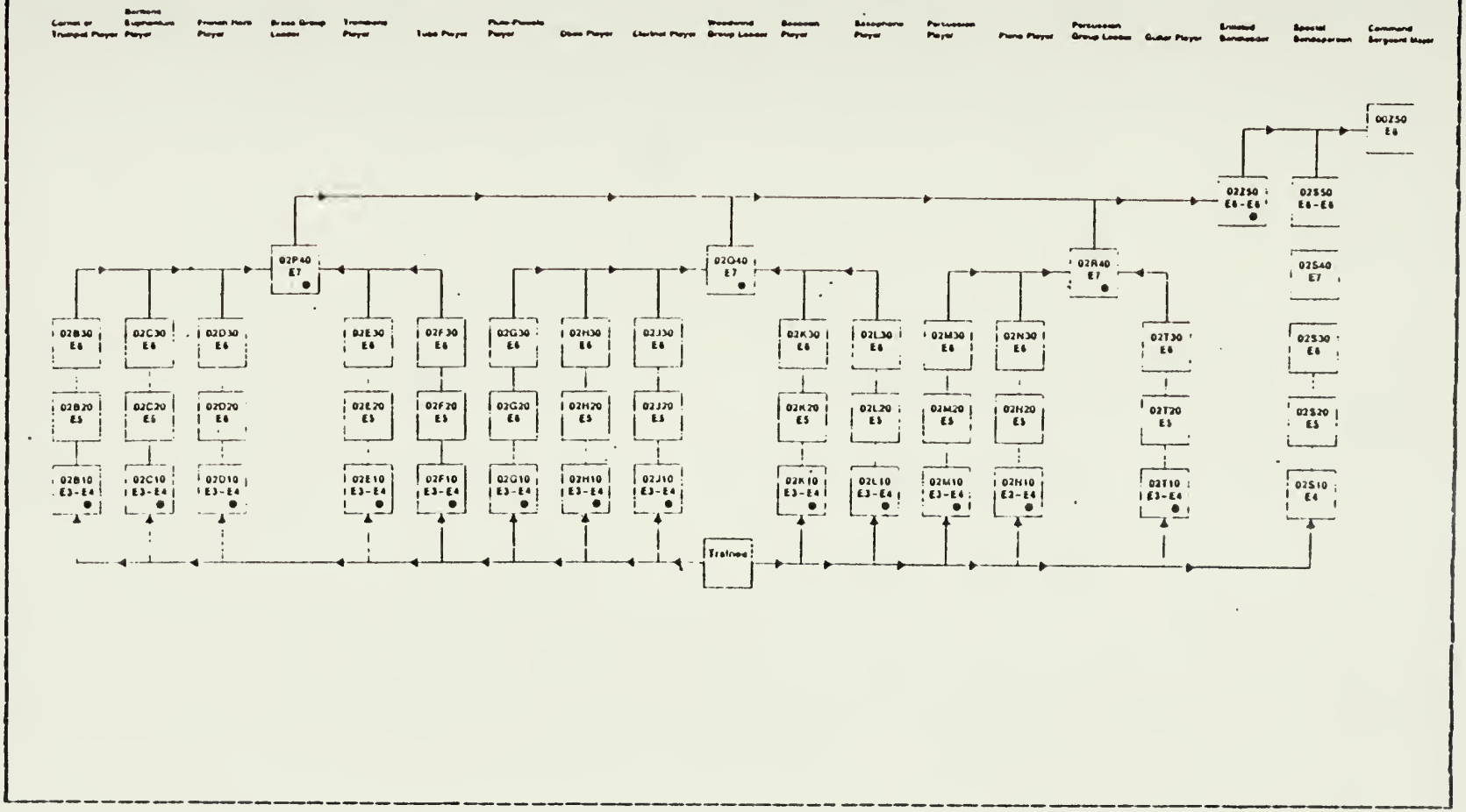


Figure A.30 Career Progression Pattern for CMF 97

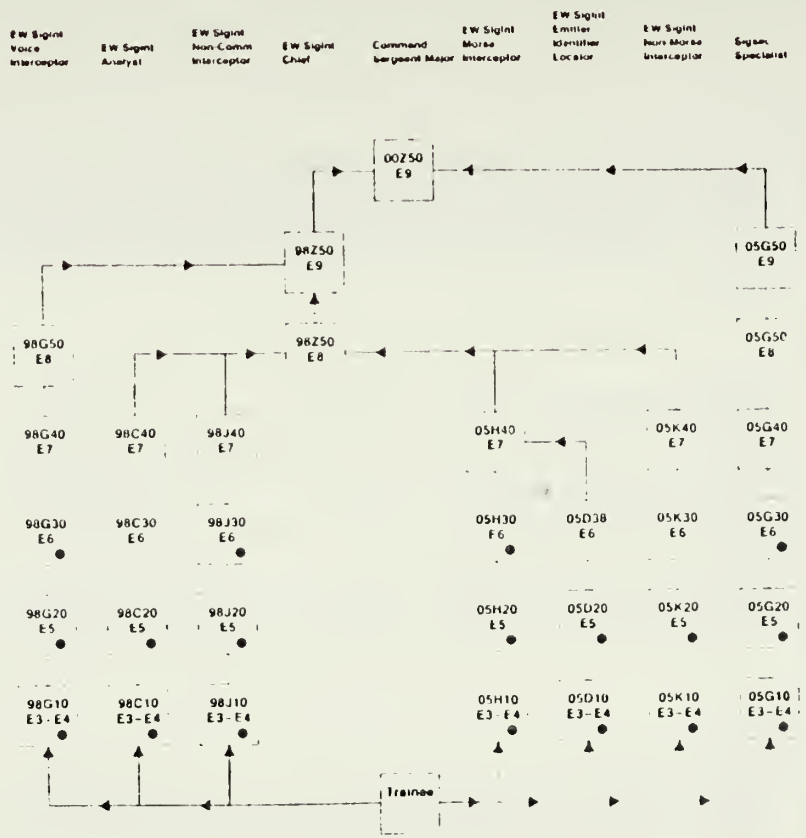


Figure A.31 Career Progression Pattern for CMF 98

APPENDIX B

AUTHORIZATIONS AND INVENTORIES BY DUTY POSITION

TABLE 14

Authorizations and Inventories for CMF 11

DUTY POSITION	AUTHORIZATIONS FY84	FY85	FY86	INVENTORY FY84
11B10P	4306	4285	4285	6222
11B20P	676	679	679	1444
11B30P	621	637	637	1065
11B40P	249	246	246	816
11B50P	137	137	137	448
11C10P	573	573	573	1163
11C20P	224	224	224	214
11C30P	14	15	15	120
11C40P	47	47	47	121
11H10P	523	361	361	646
11H20P	87	60	60	233
11H30P	92	64	64	147
11H40P	22	13	13	61
11M10P	0	0	0	7
11M20P	0	0	0	2
11M30P	0	0	0	4
11M40P	0	0	0	3
11B10V	58	59	59	248
11B20V	142	141	141	315
11B30V	220	234	234	293
11B40V	83	84	84	207
11B50V	31	34	34	67
11C10V	0	0	0	17
11C20V	6	6	6	19
11C30V	6	6	6	15
11C40V	0	0	0	9

TABLE 15

Authorizations and Inventories for CMF 12

DUTY POSITION	AUTHORIZATIONS FY84	FY85	FY86	INVENTORY FY84
12B10P	366	366	366	424
12B20P	107	107	107	159
12B30P	61	61	61	121
12B40P	21	23	23	93
12C10P	0	0	0	1
12C30P	0	0	0	1
12C40P	0	0	0	1
12E10P	0	0	0	2
12E20P	0	0	0	3
12E30P	0	0	0	4
12E40P	0	0	0	4
12F10P	0	0	0	2
12F20P	0	0	0	3
12F30P	0	0	0	4
12Z40P	0	0	0	1
12Z50P	12	8	8	43
12B10V	0	0	0	1
12B20V	0	0	0	1
12B30V	0	0	0	2
12B40V	0	0	0	4

TABLE 16

Authorizations and Inventories for CMF 13

DUTY POSITION	AUTHORIZATIONS FY84	FY85	FY86	INVENTORY FY84
13B10P	526	529	55	672
13B20P	73	73	7	169
13B30P	62	63	9	126
13B40P	24	24	3	85
13C10P	4	8	6	3
13C20P	1	6	4	2
13C30P	0	0	0	3
13C40P	9	8	5	29
13E10P	66	56	5	92
13E20P	16	23	2	39
13E30P	19	16	4	20
13E40P	0	3	0	0
13F10P	207	213	47	250
13F20P	115	121	24	122
13F30P	41	44	11	75
13F40P	15	17	2	47
13R10P	29	29	29	9
13R20P	7	7	7	3
13R30P	6	2	2	7
13W50P	8	7	2	4
13Y50P	20	7	3	43
13Z50P	3	3	2	5
15D10P	0	0	0	1
15D20P	0	0	0	1
15D30P	0	0	0	2
15D40P	0	0	0	2
15E10P	0	0	0	2
15E20P	0	0	0	2
15E30P	0	0	0	4
15E40P	0	0	0	1
15J10P	0	0	0	2
15J20P	0	0	0	2
15J30P	0	0	0	1
17B10P	2	3	3	5
17B20P	1	1	1	1
17B30P	1	1	1	4
17B40P	1	1	1	6
17C10P	30	35	35	36
17C20P	18	18	18	18
17C30P	8	8	8	7
17C40P	6	6	6	2
82C10P	33	34	19	54
82C20P	14	17	11	13
82C30P	6	6	3	25
82C40P	5	5	2	17
93F10P	11	11	5	6
93F20P	4	4	2	7
93F30P	2	2	1	5
93F40P	2	2	1	4
13F10V	0	0	0	4
13F20V	18	18	18	22
13F30V	8	8	8	8
13F40V	2	2	2	9

TABLE 17

Authorizations and Inventories for CMF 16

DUTY POSITION	AUTHORIZATIONS FY84	FY85	FY86	INVENTORY FY84
16B20P	0	0	0	2
16B30P	0	0	0	3
16B40P	0	0	0	8
16C10P	0	0	0	1
16C20P	0	0	0	1
16C30P	0	0	0	3
16D10P	0	0	0	3
16D20P	0	0	0	5
16D30P	0	0	0	2
16D40P	0	0	0	1
16E20P	0	0	0	1
16E30P	0	0	0	1
16H10P	9	9	9	5
16H20P	3	3	3	8
16H30P	4	4	4	4
16H40P	4	4	4	14
16J10P	8	8	8	16
16J20P	8	8	8	5
16J30P	8	8	8	6
16P10P	0	0	0	1
16P20P	0	0	0	2
16P30P	0	0	0	9
16R10P	144	208	208	177
16R20P	48	72	72	41
16R30P	53	79	79	56
16R40P	13	19	19	38
16S10P	72	213	213	162
16S20P	71	50	50	32
16S30P	15	26	26	24
16S40P	0	7	7	7
16Z50P	7	3	3	25

TABLE 18

Authorizations and Inventories for CMF 18

DUTY POSITION	AUTHORIZATIONS FY84	FY85	FY86	INVENTORY FY84
18B10S	6	6	6	182
18B20S	7	9	9	140
18B30S	102	103	103	411
18B40S	398	513	525	451
18C10S	0	0	0	18
18C20S	135	12	0	63
18C30S	29	29	29	141
18C40S	152	209	215	120
18D10S	6	8	8	56
18D20S	6	7	7	87
18D30S	180	237	243	146
18D40S	160	218	224	110
18E10S	77	109	118	96
18E20S	216	272	279	138
18E30S	47	48	48	108
18E40S	213	282	287	133
18Z50S	523	570	576	685

TABLE 19

Authorizations and Inventories for CMF 19

DUTY POSITION	AUTHORIZATIONS FY84	FY85	FY86	INVENTORY FY84
19D10P	20	31	31	64
19D20P	3	6	6	52
19D30P	6	9	9	48
19D40P	11	12	12	33
19E10P	130	135	135	184
19E20P	51	51	51	51
19E30P	37	37	37	73
19E40P	1	1	1	44
19K30P	0	0	0	7
19K40P	0	0	0	6
19Z50P	12	12	12	41

TABLE 20

Authorizations and Inventories for CMF 23

DUTY POSITION	AUTHORIZATIONS FY84	FY85	FY86	INVENTORY FY84
22N30P	0	0	0	3
23W50P	0	0	0	1
24C40P	0	0	0	1
24E30P	0	0	0	1
24H20P	0	0	0	3
24H30P	0	0	0	2
24J20P	0	0	0	1
24J30P	0	0	0	1
24K20P	0	0	0	1
24K30P	0	0	0	3
24L30P	0	0	0	2
24P30P	0	0	0	2
24Q10P	0	0	0	1
24Q30P	0	0	0	1
24Q40P	0	0	0	1
24R40P	0	0	0	2
24R50P	0	0	0	1
24T30P	0	0	0	3
24T40P	0	0	0	1
24U20P	0	0	0	2
24U30P	0	0	0	2
24U40P	0	0	0	1
24V40P	0	0	0	2
25L20P	0	0	0	2
25L30P	0	0	0	1
25L40P	0	0	0	2
26H20P	0	0	0	2
26H30P	0	0	0	2

TABLE 21

Authorizations and Inventories for CMF 27

DUTY POSITION	AUTHORIZATIONS FY84	FY85	FY86	INVENTORY FY84
24M10P	8	12	12	10
24M20P	6	8	8	4
24M30P	6	7	7	7
24M40P	5	6	6	8
27B10P	4	4	4	0
27B20P	2	2	2	7
27B30P	0	0	0	1
27B40P	2	2	2	6
27E10P	28	25	21	21
27E20P	12	10	9	13
27E30P	1	1	1	11
27F10P	11	17	15	6
27F20P	4	6	6	9
27F30P	4	4	4	3
27G20P	0	0	0	2
27G30P	0	0	0	1
27G40P	2	1	1	4
27H10P	4	4	4	1
27H20P	4	4	4	1
27H30P	1	1	1	0
27N10P	6	0	0	6
27N20P	2	0	0	2
27Z50P	4	3	3	6
46N30P	0	0	0	1

TABLE 22

Authorizations and Inventories for CMF 28

DUTY POSITION	AUTHORIZATIONS FY84	FY85	FY86	INVENTORY FY84
26D10P	0	0	0	1
26D30P	1	0	0	0
35K10P	13	16	16	3
35K20P	8	8	8	17
35L10P	9	7	7	2
35L20P	3	3	3	10
35M10P	5	5	5	3
35M20P	2	2	2	4
35P30P	5	5	5	13
35P40P	1	1	1	5
35R10P	3	3	3	0
35R20P	1	1	1	2

TABLE 23

Authorizations and Inventories for CMF 29

DUTY POSITION	AUTHORIZATIONS FY84	FY85	FY86	INVENTORY FY84
26B10P	2	3	3	5
26B20P	1	0	0	1
26C10P	2	2	2	3
26C20P	1	1	1	0
26C30P	0	0	0	6
26L10P	3	3	3	6
26L20P	1	1	0	13
26L30P	0	0	0	2
26L40P	0	1	1	1
26V10P	0	0	0	7
26V20P	0	0	0	10
26V30P	0	0	0	3
26V40P	0	0	0	1
26Y10P	0	0	0	2
26Y20P	0	0	0	6
26Y30P	1	1	1	4
26Y40P	0	0	0	5
31E10P	19	26	27	23
31E20P	41	45	44	35
31E30P	11	11	11	18
31E50P	0	0	0	1
31J10P	18	23	27	30
31J20P	21	22	23	21
31J30P	3	3	3	8
31S10P	6	6	8	16
31S20P	11	13	13	14
31S30P	5	6	6	9
31S40P	0	0	0	3
31T10P	5	5	4	5
31T20P	2	3	4	5
32P40P	0	0	0	2
32G10P	0	0	0	1
32G20P	0	0	0	8
32G30P	0	0	0	1
32H10P	11	18	18	4
32H20P	10	13	13	10
32H30P	14	18	17	7
32Z40P	18	21	20	34
32Z50P	1	1	1	14
35E10P	9	15	15	7
35E20P	4	4	4	7
35E30P	0	0	0	3
35H20P	4	4	4	11
35H30P	0	0	0	15
35H40P	0	0	0	1
36H10P	5	6	9	3
36H20P	8	8	8	6
36H30P	0	0	0	3
36H40P	0	0	0	6
36L10P	0	0	0	1
36L30P	1	1	0	0

TABLE 24

Authorizaticns and Inventories for CMF 31

DUTY POSITION	AUTHORIZATIONS FY84	FY85	FY86	INVENTORY FY84
05B10P	243	239	231	321
05B20P	49	50	44	108
05C10P	250	268	262	283
05C20P	133	139	127	130
05C30P	30	35	35	59
26Q10P	11	11	10	13
26Q20P	6	6	6	13
26Q30P	1	1	1	13
26Q40P	0	0	0	2
26R20P	0	0	0	1
31M10P	68	68	96	167
31M20P	30	30	45	56
31M30P	4	4	29	41
31N10P	4	4	7	11
31N20P	0	0	3	9
31N30P	3	2	1	6
31V10P	111	121	99	105
31V20P	18	17	12	76
31V30P	92	91	77	183
31V40P	20	21	21	82
31V50P	8	8	4	20
31Z40P	39	41	42	119
31Z50P	16	17	14	42
32D20P	0	0	0	1
32D30P	0	0	0	8
32D40P	0	0	0	1
36C10P	66	72	63	85
36C20P	16	17	13	38
36C30P	3	4	7	33
36C40P	0	0	0	4
36K10P	437	437	363	416
36K20P	55	57	42	104
36M10P	38	38	25	9
36M20P	18	18	11	11
36M30P	1	1	1	3
72E10P	167	187	191	121
72E20P	84	95	81	73
72E30P	17	22	33	33
72E40P	5	6	6	19
72G10P	0	0	0	7
72G20P	0	0	0	11
72G30P	0	0	0	7
72G40P	0	0	0	1
72H20P	0	0	0	1
72H30P	0	0	0	2
31V10V	0	0	0	3
31V20V	0	0	0	3
31V30V	6	6	6	16
31V40V	2	2	2	3
31V50V	0	0	0	2

TABLE 25

Authorizations and Inventories for CMF 33

DUTY POSITION	AUTHORIZATIONS FY84	FY85	FY86	INVENTORY FY84
33S10P	5	7	7	8
33S20P	6	8	8	11
33S30P	2	2	2	11
33S40P	1	1	1	3

TABLE 26

Authorizations and Inventories for CMF 51

DUTY POSITION	AUTHORIZATIONS FY84	FY85	FY86	INVENTORY FY84
00B20P	0	0	0	2
00B30P	0	0	0	1
00B40P	0	0	0	1
51B10P	3	3	3	14
51B20P	2	2	2	9
51C10P	4	4	4	4
51C20P	1	1	1	5
51G10P	0	0	0	4
51G20P	2	2	2	3
51H30P	3	4	4	19
51H40P	3	3	3	10
51K10P	4	4	4	12
51K20P	1	1	1	1
51M10P	0	0	0	3
51M20P	0	0	0	1
51M30P	0	0	0	1
51R10P	3	3	3	15
51R20P	1	1	1	5
51R30P	0	0	0	1
51T30P	0	0	0	5
51T40P	0	0	0	2
51Z50P	1	0	0	5
52E30P	0	0	0	2
52E40P	0	0	0	4
62E10P	116	117	117	96
62E20P	60	60	60	67
62F10P	21	10	10	23
62F20P	8	6	6	15
62G10P	0	0	0	1
62H10P	4	4	4	1
62H20P	2	2	2	3
62H30P	0	0	0	2
62J10P	19	19	19	36
62J20P	5	5	5	6
62N30P	9	9	9	15
62N40P	10	10	10	17
81B10P	8	7	7	8
81B20P	1	1	1	7
82B10P	4	4	4	4
82B20P	6	6	6	6

TABLE 27

Authorizations and Inventories for CMF 54

DUTY POSITION	AUTHORIZATIONS FY84	FY85	FY86	INVENTORY FY84
54C20P	0	0	0	3
54C30P	0	0	0	5
54C40P	0	0	0	1
54E10P	57	0	0	114
54E20P	129	120	112	95
54E30P	45	41	38	129
54E40P	23	17	17	45
54Z50P	4	4	4	10
54E20V	6	6	6	0
54E30V	2	2	2	3
54E40V	0	0	0	1

TABLE 28

Authorizations and Inventories for CMF 55

DUTY POSITION	AUTHORIZATIONS FY84	FY85	FY86	INVENTORY FY84
35F10P	0	0	0	1
35F20P	0	0	0	1
55B10P	56	69	69	81
55B20P	4	6	6	8
55B30P	4	6	6	9
55B40P	2	1	1	6
55D10P	0	0	0	6
55D20P	2	0	0	21
55D30P	0	0	0	12
55D40P	0	0	0	6
55D50P	0	0	0	3
55G10P	0	0	0	1
55G20P	0	0	0	4
55G30P	0	0	0	2
55G40P	0	0	0	2
55R10P	8	5	5	14
55R20P	18	19	19	5
55R30P	0	0	0	2
55X40P	0	0	0	3
55Z50P	1	0	0	2

TABLE 29

Authorizations and Inventories for CMF 63

DUTY POSITION	AUTHORIZATIONS FY84	FY85	FY86	INVENTORY FY84
%1C10P	%	%	%	8
%1C30P	0	0	0	3
%1J10P	1	1	1	1
%1J20P	1	1	1	0
%1J30P	0	0	0	1
%%810P	15	16	1%	8
%%820P	10	9	9	20
%%E10P	6	7	7	%
%%E20P	1	0	0	7
%%E30P	2	2	2	9
%%E%0P	0	0	0	5
%5810P	8	8	8	5
%5820P	5	5	5	8
%5D10P	1	1	1	0
%5D20P	0	0	0	1
%5E10P	0	0	0	2
%5G10P	0	1	1	2
%5G20P	1	0	0	2
%5K10P	8	8	8	8
%5K20P	3	3	3	3
%5K30P	5	5	5	8
%5L10P	7	7	7	3
%5L20P	2	2	2	1
%5M10P	8	8	8	21
%5M20P	3	3	3	1
%5T10P	0	0	0	1
%5Z%0P	3	3	3	12
52C10P	22	21	2%	%7
52C20P	6	6	6	13
52C30P	2	2	2	6
52D10P	36	38	36	55
52D20P	1%	16	16	10
52D30P	1	1	1	12
62B10P	7%	75	75	70
62B20P	23	2%	2%	30
62B30P	2	2	2	10
62B%0P	6	5	5	21
63B10P	537	508	%59	%61
63B20P	186	20%	185	233
63B30P	75	72	69	115
63B%0P	23	30	2%	87
63B50P	10	7	7	15
63D10P	0	0	0	2
63D20P	0	0	0	1
63D30P	0	0	0	%
63D%0P	0	0	0	2
63D50P	0	0	0	2
63E10P	0	0	0	1
63E%0P	0	0	0	1
63G10P	8	8	8	13
63G20P	1	1	1	%
63H10P	3	3	3	39
63H20P	1	1	1	8
63H30P	10	11	11	32
63H%0P	9	10	10	23
63J10P	12	10	10	16
63J20P	1	1	1	%
63M10P	28	16	16	2%
63M20P	6	6	6	1
63M30P	5	6	6	9
63M%0P	0	3	3	12
63M50P	0	0	0	1
63S10P	0	6	6	7
63S20P	2	7	7	16
63T10P	0	0	0	7
63T20P	0	0	0	%
63T30P	0	0	0	6
63T%0P	0	0	0	6
63T50P	0	0	0	1
63W10P	72	38	35	29
63W20P	20	12	11	21
63Y10P	1	1	1	25
63Y20P	1	1	1	5
63Z50P	12	8	8	26

TABLE 30

Authorizations and Inventories for CMF 64

DUTY POSITION	AUTHORIZATIONS FY84	FY85	FY86	INVENTORY FY84
57H20P	0	0	0	3
57H30P	0	0	0	2
57H40P	0	0	0	1
61B10P	0	0	0	3
61B20P	0	0	0	2
61B30P	0	0	0	3
61B40P	0	0	0	3
61Z50P	0	0	0	1
64C10P	301	346	344	304
64C20P	7	9	9	122
64C30P	25	26	26	52
64C40P	4	3	3	16
64Z50P	3	2	2	10
71N10P	3	5	5	5
71N20P	1	1	1	6
71N30P	3	1	1	11
71N40P	1	3	3	5
71P10P	21	27	27	14
71P20P	1	1	1	7
71P30P	3	2	2	9
71P40P	6	6	6	6
71P50P	2	3	3	7
93E30P	0	0	0	2
93H10P	5	0	0	5
93H20P	2	0	0	16
93H30P	2	0	0	29
93H40P	0	0	0	5
93J10P	6	0	0	9
93J20P	2	0	0	19
93J30P	4	0	0	20
93J40P	2	0	0	4
93J50P	1	0	0	0

TABLE 31

Authorizations and Inventories for CMF 67

DUTY POSITION	AUTHORIZATIONS FY84	FY85	FY86	INVENTORY FY84
66J30P	0	0	0	5
66N30P	0	0	0	5
66V20P	0	0	0	1
66V30P	0	0	0	3
66Y20P	0	0	0	1
66Y30P	0	0	0	4
67G10P	2	3	3	3
67G20P	5	8	8	12
67G30P	0	0	0	5
67G40P	0	0	0	1
67H20P	0	0	0	1
67H30P	0	0	0	2
67N10P	15	27	27	57
67N20P	6	13	13	66
67N30P	1	2	2	39
67T10P	37	26	26	35
67T20P	16	9	9	25
67T30P	2	2	2	21
67U10P	0	0	0	11
67U20P	0	0	0	12
67U30P	0	0	0	7
67U40P	0	0	0	1
67V10P	38	34	34	25
67V20P	23	22	22	26
67V30P	2	3	3	26
67W40P	2	2	2	1
67Y10P	55	53	53	47
67Y20P	37	35	35	41
67Y30P	1	1	1	24
67Y40P	0	0	0	16
67Z40P	25	26	26	1
67Z50P	4	0	0	28
68B10P	23	22	22	11
68B20P	6	6	6	6
68B30P	1	2	2	2
68D10P	18	18	18	12
68D20P	2	2	2	8
68D30P	2	2	2	4
68F10P	13	10	10	3
68F20P	3	3	3	8
68F30P	2	2	2	2
68G10P	27	26	26	26
68G20P	4	0	0	17
68G30P	2	2	2	6
68H10P	10	9	9	7
68H20P	1	1	1	4
68H30P	1	1	1	1
68J10P	35	27	27	12
68J20P	9	8	8	13
68J30P	7	6	6	6
68J40P	0	0	0	2
68K40P	9	9	9	18
68M10P	18	23	23	17
68M20P	5	6	6	11
68M30P	1	2	2	3

TABLE 32

Authorizations and Inventories for CMF 71

DUTY POSITION	AUTHORIZATIONS FY84	FY85	FY86	INVENTORY FY84
00J30P	0	0	0	2
00J40P	0	0	0	11
00J50P	0	0	0	7
00U20P	1	3	1	0
00U30P	7	7	6	10
00U40P	8	10	10	11
00U50P	2	2	2	6
03C10P	1	1	1	0
03C20P	0	0	0	2
03C30P	1	1	1	8
03C40P	1	1	1	0
71C10P	7	8	8	3
71C20P	16	16	16	5
71C30P	5	5	5	9
71D10P	4	8	8	14
71D20P	27	41	39	23
71D30P	2	4	4	22
71D40P	8	7	7	16
71D50P	2	2	2	2
71E20P	2	2	2	1
71E30P	1	1	1	0
71E40P	1	1	1	6
71L10P	295	401	392	280
71L20P	64	84	83	167
71L30P	21	21	21	94
71L40P	18	23	23	61
71L50P	12	9	9	39
71M10P	26	28	26	28
71M20P	6	6	5	17
71M30P	5	6	6	8
71M40P	1	1	1	2
71M50P	1	1	1	3
73C10P	23	23	0	35
73C20P	23	24	4	30
73C30P	11	11	0	24
73C40P	3	3	0	10
73D10P	1	2	0	5
73D20P	3	2	2	4
73D30P	0	0	0	3
73D40P	1	1	1	1
73Z50P	3	3	0	14
75B10P	93	99	90	68
75B20P	68	70	65	101
75B30P	24	23	20	52
75C10P	21	23	23	17
75C20P	10	7	7	30
75C30P	1	4	4	10
75D10P	50	58	58	65
75D20P	18	22	22	45
75D30P	9	0	0	25
75E10P	26	29	29	22
75E20P	9	11	11	17
75E30P	2	2	2	7
75F10P	7	7	7	7
75F20P	6	6	6	11
75F30P	0	1	1	9
75Z30P	0	0	0	1
75Z40P	51	57	53	77
75Z50P	6	7	7	15
71L10V	1	1	1	0
75B20V	8	8	8	6
75B30V	0	0	0	5
75Z40V	2	2	2	6
75Z50V	0	0	0	1

TABLE 33

Authorizations and Inventories for CMF 74

DUTY POSITION	AUTHORIZATIONS FY84	FY85	FY86	INVENTORY FY84
34B10P	1	1	1	0
34B20P	0	0	0	1
34C20P	0	0	0	3
34C30P	0	0	0	7
34C40P	0	0	0	2
34E20P	0	0	0	1
34E30P	0	0	0	1
34F10P	0	0	0	1
34F20P	0	0	0	10
34F30P	0	0	0	2
34F40P	0	0	0	1
34H20P	0	0	0	2
34H30P	0	0	0	1
34H40P	0	0	0	2
34K20P	1	1	1	0
34K30P	1	1	1	2
34K40P	1	1	1	1
34Y10P	1	5	5	1
34Y20P	1	5	5	0
34Y30P	0	0	0	1
34Z50P	1	1	1	0
74D10P	12	5	5	16
74D20P	3	2	2	25
74D30P	3	2	2	16
74D40P	5	4	4	11
74F10P	0	1	1	10
74F20P	3	3	3	11
74F30P	4	3	3	17
74F40P	0	0	0	10
74Z50P	2	1	1	5

TABLE 34

Authorizations and Inventories for CMF 76

DUTY POSITION	AUTHORIZATIONS FY84	FY85	FY86	INVENTORY FY84
43E10P	647	707	702	396
43E20P	236	228	226	242
43E30P	142	142	142	168
43E40P	82	82	82	80
43E50P	16	15	15	41
43M10P	2	2	2	2
43M20P	0	0	0	1
57E10P	0	0	0	6
57E30P	1	0	0	0
57E40P	0	0	0	1
57F10P	0	2	2	3
57F20P	4	4	4	1
57F30P	0	0	0	1
57F40P	0	0	0	1
57F50P	0	0	0	1
76C10P	148	195	181	182
76C20P	13	18	20	60
76J10P	10	12	12	13
76J20P	2	1	1	2
76J30P	0	1	1	9
76J40P	2	2	2	2
76J50P	0	0	0	2
76P10P	125	59	59	102
76P20P	27	11	11	50
76P30P	20	18	18	34
76P40P	9	2	2	25
76V10P	46	102	97	78
76V20P	7	18	18	30
76V30P	2	11	11	14
76V40P	2	6	6	11
76X10P	19	21	21	6
76X20P	4	4	4	6
76X30P	0	0	0	5
76X40P	2	1	1	2
76Y10P	386	375	347	349
76Y20P	41	56	52	125
76Y30P	177	182	167	222
76Y40P	61	56	53	105
76Z50P	40	31	30	62
76Y10V	0	0	0	2
76Y20V	1	1	1	0
76Y30V	8	8	8	11
76Y40V	2	2	2	3

TABLE 35

Authorizations and Inventories for CMF 79

DUTY POSITION	AUTHORIZATIONS FY84	FY85	FY86	INVENTORY FY84
00E30P	0	0	0	6
00E40P	0	0	0	18
00E50P	0	0	0	6
00R30P	13	25	23	35
00R40P	5	3	4	124
00R50P	7	3	2	56
79D30P	1	1	1	6
79D40P	1	1	1	5
79D50P	1	1	1	11

TABLE 36

Authorizations and Inventories for CMF 81

DUTY POSITION	AUTHORIZATIONS FY84	FY85	FY86	INVENTORY FY84
41B10P	0	0	0	1
81C10P	1	1	1	4
81C20P	0	0	0	2
81C30P	0	0	0	3
81C40P	0	0	0	1
81Q30P	0	0	0	1
81Q40P	0	0	0	1
81Z50P	0	0	0	1
83E10P	0	4	4	0
83F10P	5	19	19	2
83F20P	1	3	3	2
83F30P	0	3	3	1

TABLE 37

Authorizations and Inventories for CMF 84

DUTY POSITION	AUTHORIZATIONS FY84	FY85	FY86	INVENTORY FY84
26T20P	0	0	0	3
26T30P	0	0	0	1
71Q10P	8	18	18	4
71Q20P	3	4	3	8
71Q30P	1	1	1	5
71Q40P	2	2	2	4
71R10P	1	6	6	0
71R20P	0	2	2	1
71R30P	0	1	1	0
71R40P	0	1	1	0
81E10P	10	31	30	7
81E20P	1	7	7	8
81E30P	0	3	3	4
84B10P	13	20	19	12
84B20P	1	1	1	16
84B30P	1	1	1	7
84B40P	0	0	0	4
84C20P	1	0	0	2
84F10P	0	6	6	0
84F20P	0	2	2	5
84F30P	0	0	0	3
84T40P	0	0	0	1
84Z50P	3	2	2	7

TABLE 38

Authorizations and Inventories for CMF 91

DUTY POSITION	AUTHORIZATIONS FY84	FY85	FY86	INVENTORY FY84
01A30P	0	0	0	1
35G10P	1	1	1	5
35G20P	0	0	0	11
35U20P	2	1	1	1
35U30P	1	2	2	8
35U40P	0	0	0	1
42C30P	0	0	0	1
42D10P	0	0	0	2
42D20P	0	0	0	4
42D30P	0	0	0	7
42E10P	0	0	0	1
42E20P	1	1	1	6
42E30P	0	0	0	3
42E40P	0	1	1	0
71G10P	16	17	17	12
71G20P	0	0	0	10
71G30P	0	0	0	4
71G40P	0	0	0	2
91B10P	319	371	350	568
91B20P	184	163	159	251
91B30P	32	33	29	170
91B40P	29	29	29	108
91B50P	9	5	5	17
91C10P	9	19	19	2
91C20P	0	4	4	10
91C30P	27	27	23	58
91C40P	4	4	4	50
91C50P	0	0	0	8
91D10P	8	0	0	16
91D20P	5	5	5	19
91D30P	8	5	5	8
91D40P	0	0	0	4
91D50P	0	0	0	1
91E10P	7	8	8	10
91E20P	4	4	4	29
91E30P	0	0	0	11
91E40P	0	0	0	2
91F10P	0	0	0	2
91F20P	0	0	0	3
91F30P	0	0	0	1
91G10P	2	2	2	4
91G20P	6	6	6	7
91G30P	0	0	0	11
91G40P	0	0	0	1
91H10P	0	0	0	2
91H20P	4	4	4	3
91H30P	0	0	0	3
91J30P	0	0	0	2
91J40P	0	0	0	1
91L10P	0	0	0	2
91M10P	0	0	0	1
91M20P	0	0	0	3
91P10P	0	0	0	2
91P20P	5	5	5	14
91P30P	0	0	0	7
91P40P	0	0	0	3
91Q10P	0	0	0	3
91Q20P	7	8	8	17
91Q30P	0	0	0	9
91R10P	0	0	0	1
91R20P	0	0	0	3
91R40P	0	0	0	2
91S10P	3	3	3	6
91S20P	2	3	3	2
91S30P	4	4	4	4
91S40P	1	2	2	4
91S50P	0	0	0	1
91T20P	0	0	0	1
91T30P	0	0	0	2
91U20P	0	0	0	1
91V20P	0	0	0	1
91V30P	0	0	0	3
91W40P	0	0	0	1
91Y10P	2	2	2	0
92B10P	3	4	4	13
92B20P	2	1	1	13
92B30P	2	2	2	6
91B10V	0	0	0	4
91B20V	20	20	20	3
91B30V	0	0	0	7
91B40V	0	0	0	6
91B50V	0	0	0	2

TABLE 39

Authorizations and Inventories for CMF 92

DUTY POSITION	AUTHORIZATIONS FY84	FY85	FY86	INVENTORY FY84
51N10P	18	18	18	7
51N20P	10	10	10	14
51N30P	2	2	2	6
51N40P	0	1	1	3
76W10P	110	98	97	114
76W20P	29	34	34	30
76W30P	4	4	4	20
76W40P	6	5	5	9
76W50P	0	0	0	4
92C10P	3	6	6	4
92C20P	0	0	0	1
92C40P	0	0	0	1

TABLE 40

Authorizations and Inventories for CMF 94

DUTY POSITION	AUTHORIZATIONS FY84	FY85	FY86	INVENTORY FY84
94B10P	427	450	414	338
94B20P	113	115	101	98
94B30P	105	106	92	125
94B40P	86	100	95	119
94B50P	12	13	12	33
94F10P	0	0	0	2
94F20P	0	0	0	2
94F30P	0	0	0	2
94F40P	0	0	0	1
94B10V	0	0	0	2
94B20V	2	2	2	0
94B30V	2	2	2	0
94B40V	2	2	2	1
94B50V	0	0	0	1

TABLE 41

Authorizations and Inventories for CMF 95

DUTY POSITION	AUTHORIZATIONS FY84	FY85	FY86	INVENTORY FY84
95B10P	218	103	0	334
95B20P	29	16	1	129
95B30P	25	14	2	132
95B40P	10	5	1	59
95B50P	2	0	0	21
95C10P	0	0	0	3
95C20P	0	0	0	6
95C30P	0	0	0	6
95C40P	0	0	0	2
95D20P	0	0	0	1
95D30P	0	0	0	3
95D40P	0	0	0	6
95D50P	0	0	0	2

TABLE 42

Authorizations and Inventories for CMF 96

DUTY POSITION	AUTHORIZATIONS FY84	FY85	FY86	INVENTORY FY84
17K10P	28	32	32	62
17K20P	29	33	33	15
17K30P	11	12	12	16
17K40P	3	3	3	13
17K50P	1	1	1	3
17M20P	0	0	0	1
17M30P	0	0	0	3
96B10P	28	79	79	24
96B20P	34	74	69	37
96B30P	24	53	52	45
96B40P	14	55	55	32
96B50P	12	24	24	18
96C10P	2	15	15	4
96C20P	2	54	54	3
96C30P	3	32	32	11
96C40P	1	15	15	11
96C50P	0	0	0	1
96D10P	0	0	0	3
96D20P	3	4	4	7
96D30P	0	0	0	8
96D40P	2	2	2	9
96D50P	2	2	2	5
96H10P	0	0	0	1
96H20P	0	0	0	2
96H30P	0	0	0	1
96H40P	0	0	0	1
96Z50P	4	6	6	11
97B10P	0	0	0	11
97B20P	1	1	1	10
97B30P	4	4	4	27
97B40P	7	8	8	14
97B50P	4	5	5	4
97C10P	19	22	22	0
97C20P	16	20	20	0
97C30P	5	6	6	2
97C40P	8	10	10	2
96B20V	0	0	0	1
96B30V	1	1	1	2
96B40V	0	0	0	1
96B50V	0	0	0	1

TABLE 43

Authorizations and Inventories for CMF 97

DUTY POSITION	AUTHORIZATIONS FY84	FY85	FY86	INVENTORY FY84
02B10P	4	3	3	0
02B20P	1	1	1	2
02B30P	1	1	1	3
02C20P	1	0	0	1
02C30P	1	1	1	3
02D10P	1	1	1	0
02D20P	1	1	1	0
02D30P	1	1	1	2
02E10P	2	1	1	0
02E20P	1	1	1	0
02E30P	1	1	1	2
02F10P	1	0	0	0
02F20P	1	1	1	0
02F30P	1	1	1	1
02G10P	0	0	0	1
02G20P	1	0	0	0
02G30P	1	1	1	1
02H30P	1	0	0	0
02J10P	4	2	2	4
02J20P	1	1	1	1
02J30P	1	1	1	1
02K20P	1	0	0	0
02L10P	2	1	1	0
02L20P	1	1	1	0
02L30P	1	1	1	2
02M20P	1	0	0	2
02M30P	1	1	1	0
02N20P	1	1	1	0
02P40P	1	1	1	4
02Q40P	1	1	1	1
02R40P	1	1	1	0
02S30P	0	0	0	2
02S40P	0	0	0	1
02T30P	1	0	0	1
02Z50P	1	1	1	4

TABLE 44

Authorizations and Inventories for CMF 98

DUTY POSITION	AUTHORIZATIONS FY84	FY85	FY86	INVENTORY FY84
00D10P	0	3	3	0
00D40P	1	1	1	0
05D10P	3	4	4	4
05D20P	3	4	4	6
05D30P	1	2	2	3
05G10P	9	10	10	21
05G20P	6	8	8	10
05G30P	2	2	2	8
05G40P	1	1	1	0
05H10P	0	0	0	12
05H20P	10	12	12	13
05H30P	1	1	1	17
05H40P	1	2	2	14
05K20P	0	0	0	4
05K30P	0	0	0	7
09W20P	0	0	0	5
09W30P	0	0	0	3
98C10P	19	22	22	16
98C20P	16	20	20	23
98C30P	5	6	6	15
98C40P	8	10	10	9
98G10P	21	25	25	26
98G20P	18	22	22	37
98G30P	5	6	6	34
98G40P	3	4	4	9
98J10P	12	13	13	15
98J20P	5	6	6	5
98J30P	6	7	7	6
98J40P	5	8	8	4
98Z50P	3	3	3	9

APPENDIX C

TRANSITION MATRICES

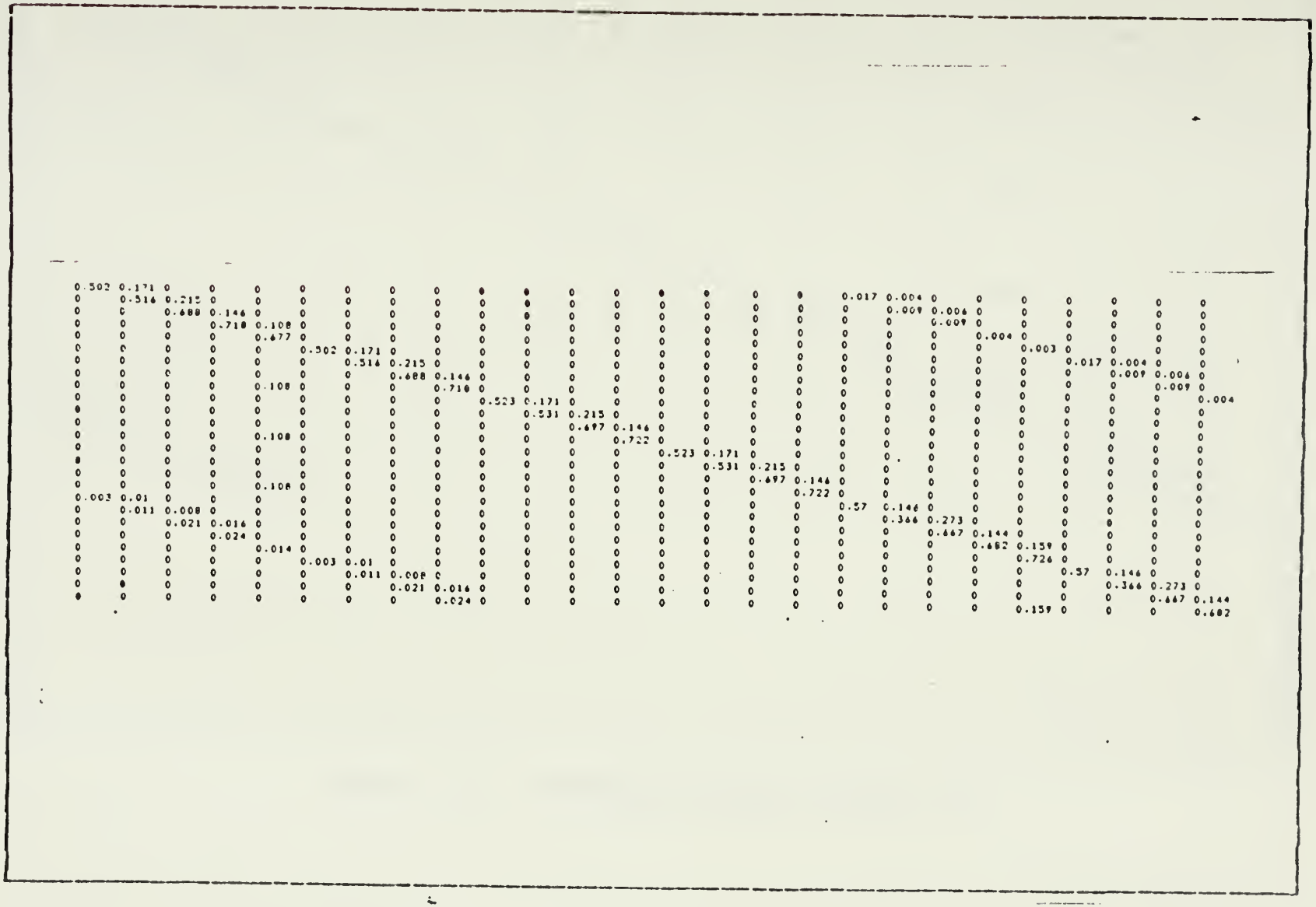


Figure C.1 Transition Matrix for CMF 11

0.502	0.171	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.017	0.004	0	0
0	0.516	0.215	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.009	0.006	0
0	0	0.688	0.146	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.009	0
0	0	0	0.718	0	0	0	0	0	0	0	0	0	0	0	0.108	0	0	0	0.004
0	0	0	0	0.523	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0.697	0.146	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0.722	0	0	0	0	0	0	0	0	0.108	0	0	0	0
0	0	0	0	0	0	0	0.523	0.171	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0.531	0.215	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0.697	0.146	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0.722	0	0	0	0	0.108	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0.523	0.171	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0.531	0.215	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0.697	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.722	0.108	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.68	0	0	0	0
0.003	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.57	0.146	0	0
0	0.011	0.008	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.366	0.273	0
0	0	0.021	0.016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.667	0.144
0	0	0	0.024	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.682

Figure C.2 Transition Matrix for CMF 12

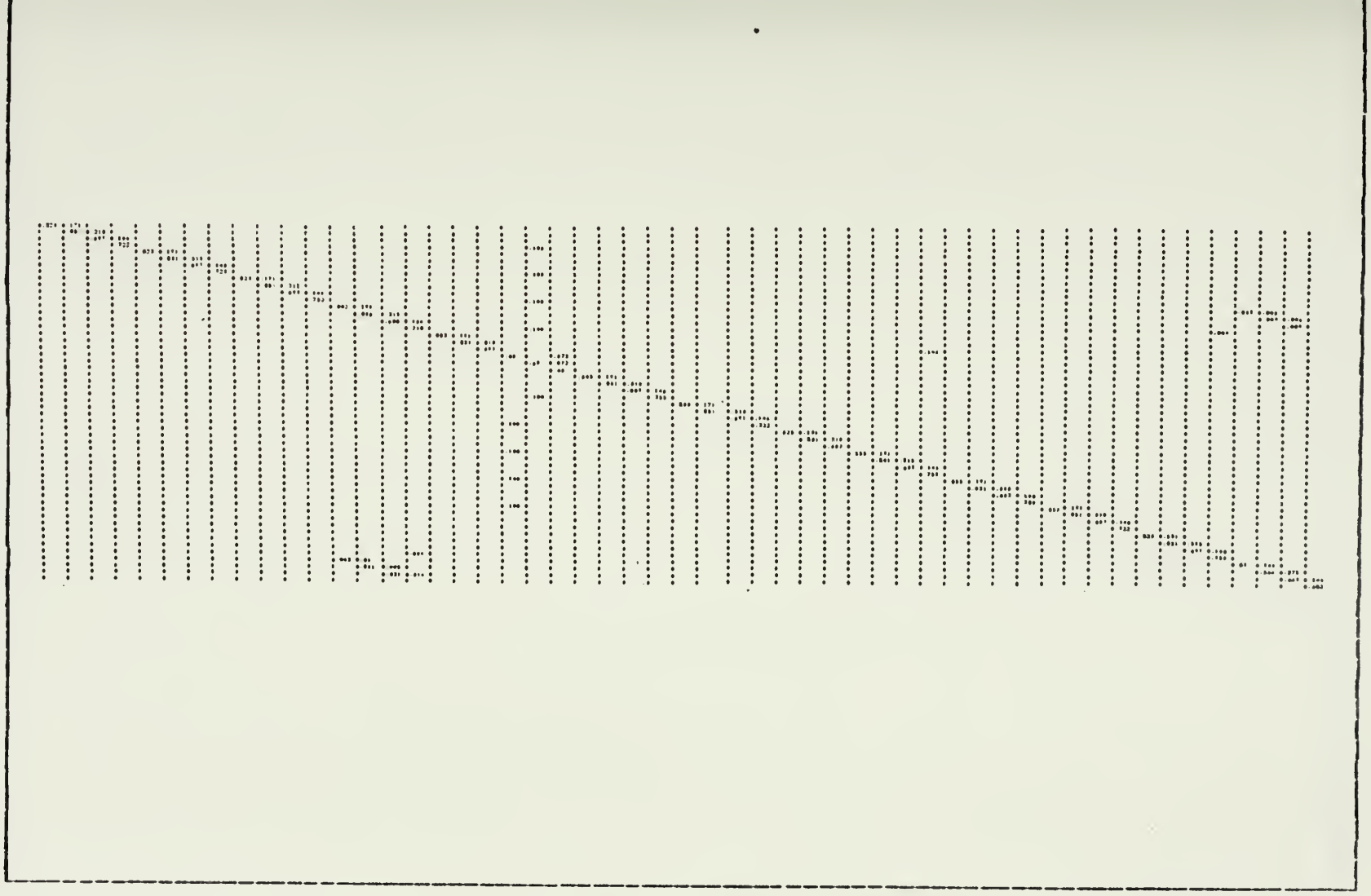


Figure C.3 Transition Matrix for CMF 13

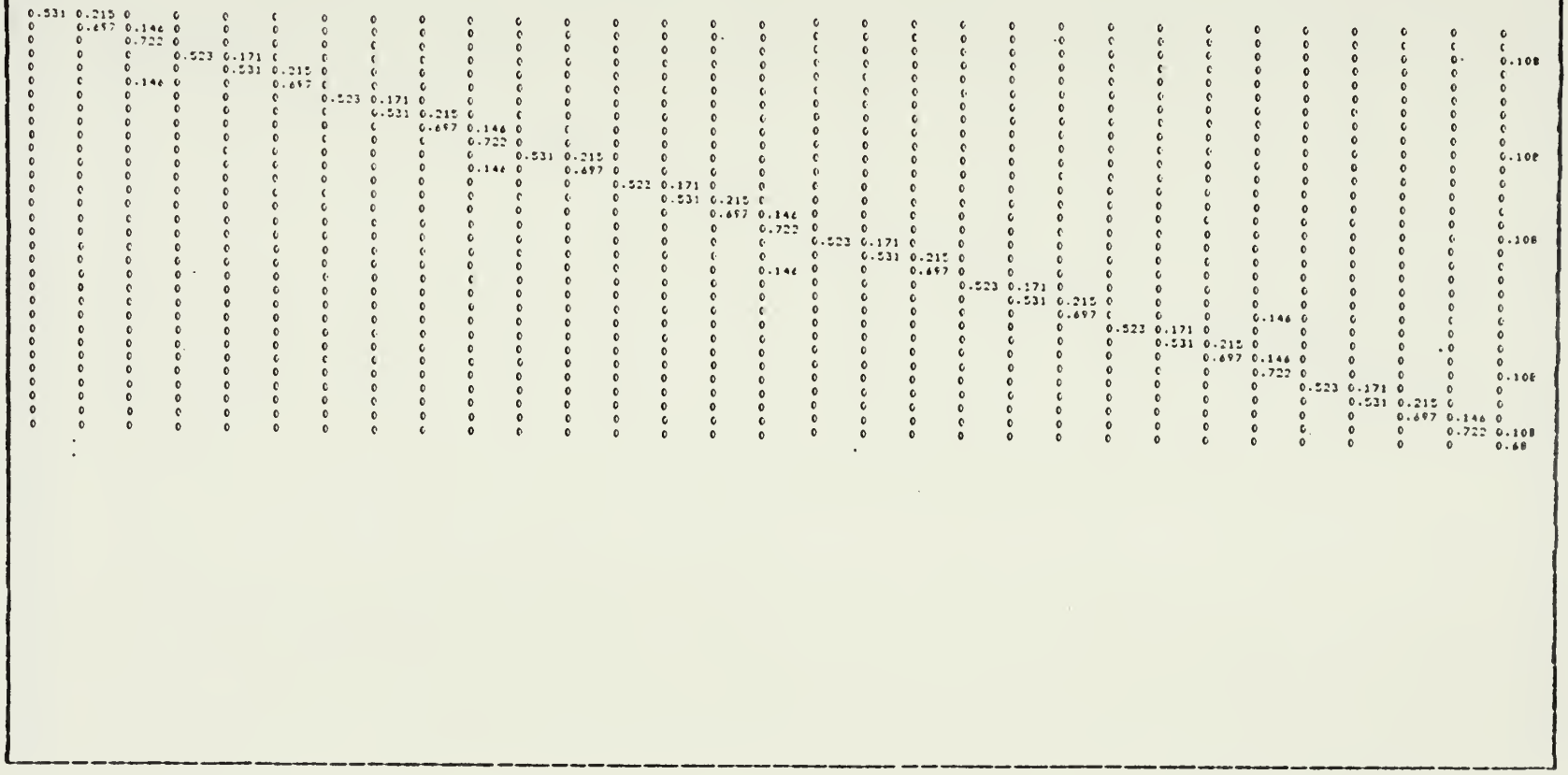


Figure C.4 Transition Matrix for CMF 16

0.384	0.435	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
0	0.43	0.449	0	0	0	0	0	0	0	0	0	0	0	0	0	
0	0	0.718	0.217	0	0	0	0	0	0	0	0	0	0	0	0	
0	0	0	0.789	0	0	0	0	0	0	0	0	0	0	0	0	0.124
0	0	0	0	0.384	0.435	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0.43	0.449	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0.718	0.217	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0.789	0	0	0	0	0	0	0	0	0.124
0	0	0	0	0	0	0	0	0.384	0.435	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0.43	0.449	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0.718	0.217	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0.789	0	0	0	0	0.124
0	0	0	0	0	0	0	0	0	0	0	0	0.384	0.435	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0.43	0.449	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.718	0.217	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.789	0.124
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.757

Figure C.5 Transition Matrix for CMF 18

0.523	0.171	0	0	0	0	0	0	0	0	0
0	0.531	0.215	0	0	0	0	0	0	0	0
0	0	0.697	0.146	0	0	0	0	0	0	0
0	0	0	0.722	0	0	0	0	0	0	0.108
0	0	0	0	0.523	0.171	0	0	0	0	0
0	0	0	0	0	0.531	0.215	0	0	0	0
0	0	0	0	0	0	0.697	0.146	0	0	0
0	0	0	0	0	0	0	0.722	0	0	0.108
0	0	0	0	0	0	0	0	0.697	0.146	0
0	0	0	0	0	0	0	0	0	0.722	0.108
0	0	0	0	0	0	0	0	0	0	0.68

Figure C.6 Transition Matrix for CMF 19

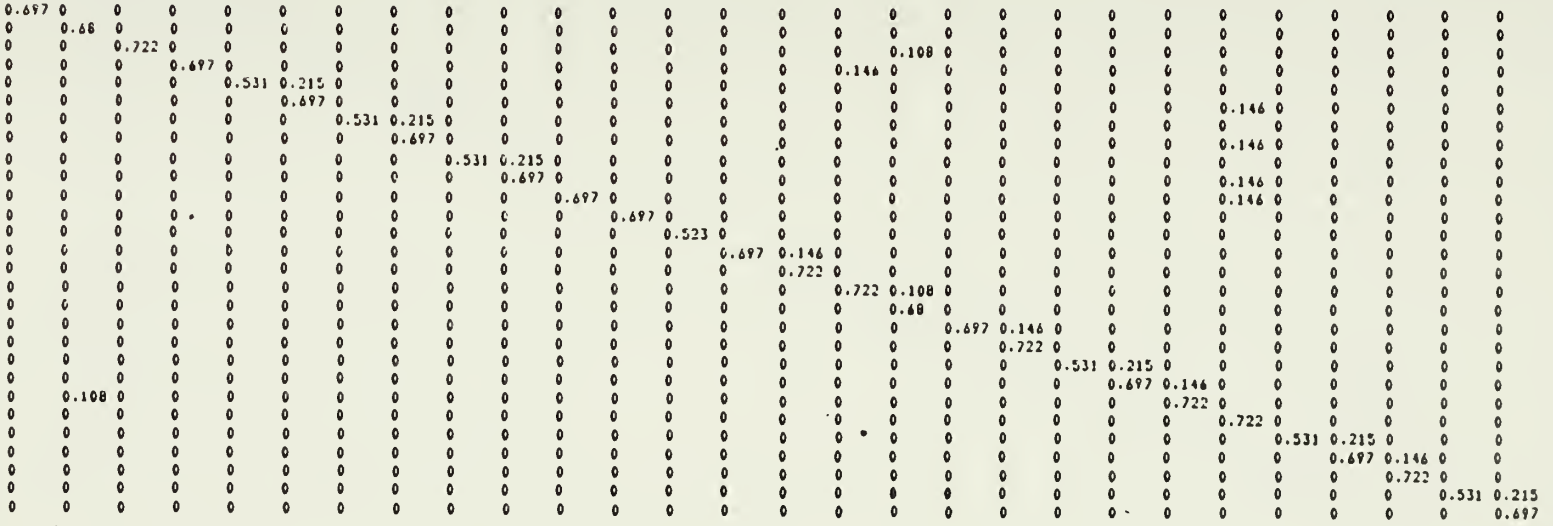
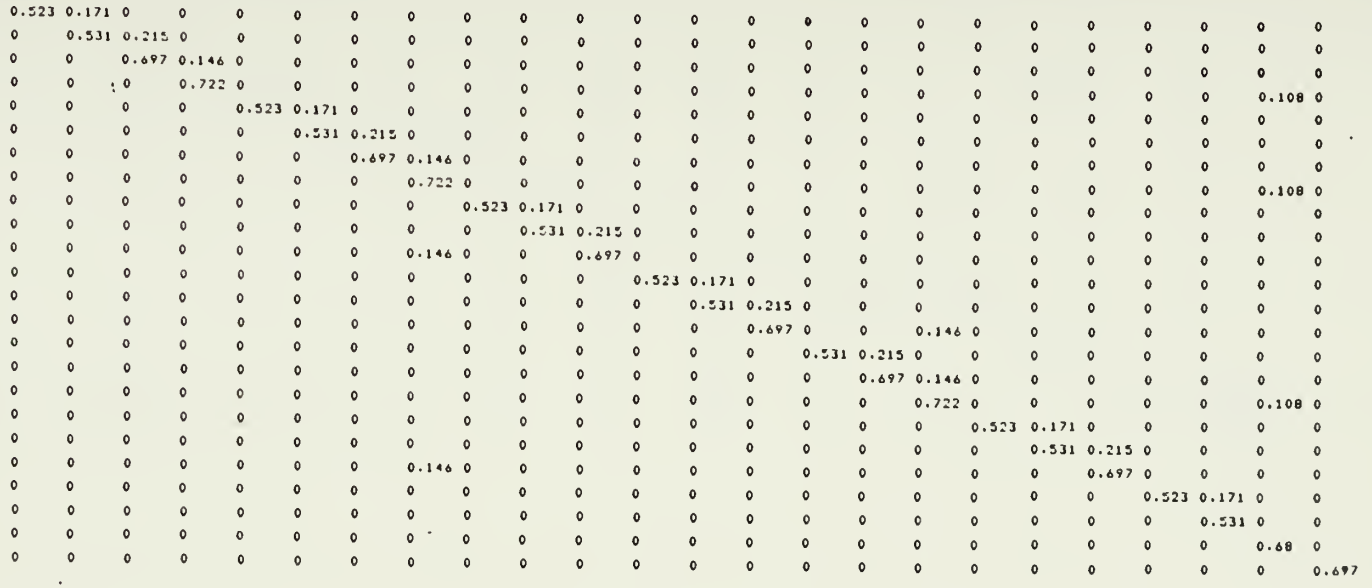


Figure C.7 Transition Matrix for CMF 23



0.523	0.171	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0.531	0.215	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0.697	0.146	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0.722	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0.523	0.171	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.108	0	
0	0	0	0	0	0.531	0.215	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0.697	0.146	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0.722	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.108	0		
0	0	0	0	0	0	0	0	0.523	0.171	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0.531	0.215	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0.146	0	0	0.697	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0.523	0.171	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0.531	0.215	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0.697	0	0	0	0.146	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.531	0.215	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.697	0.146	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.722	0	0	0	0	0	0	0.108	0	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.523	0.171	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.531	0.215	0	0	0	0	0	0
0	0	0	0	0	0	0	0.146	0	0	0	0	0	0	0	0	0	0	0	0.697	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.523	0.171	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.531	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.68	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.697	0	0

Figure C.8 Transition Matrix for CMF 27

0.523	0	0	0	0	0	0	0	0	0	0	0
0	0.697	0	0	0	0	0	0	0	0.146	0	0
0	0	0.523	0.171	0	0	0	0	0	0	0	0
0	0	0	0.531	0	0	0	0	0.215	0	0	0
0	0	0	0	0.523	0.171	0	0	0	0	0	0
0	0	0	0	0	0.531	0	0	0.215	0	0	0
0	0	0	0	0	0	0.523	0.171	0	0	0	0
0	0	0	0	0	0	0	0.531	0.215	0	0	0
0	0	0	0	0	0	0	0	0.697	0.146	0	0
0	0	0	0	0	0	0	0	0	0.722	0	0
0	0	0	0	0	0	0	0	0	0	0.523	0.171
0	0	0	0	0	0	0	0	0.215	0	0	0.531

Figure C.9 Transition Matrix for CMF 28

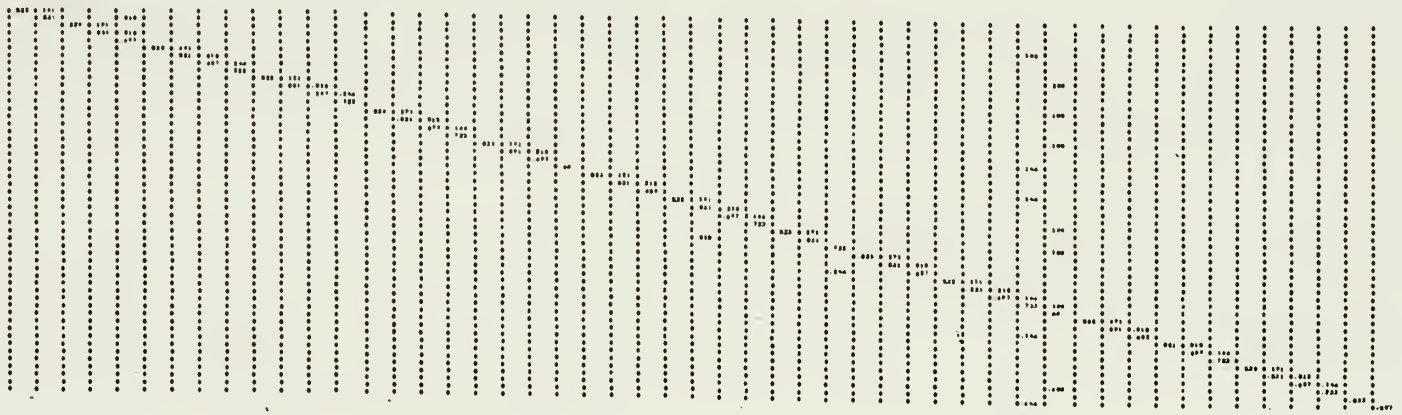


Figure C.10 Transition Matrix for CMF 29

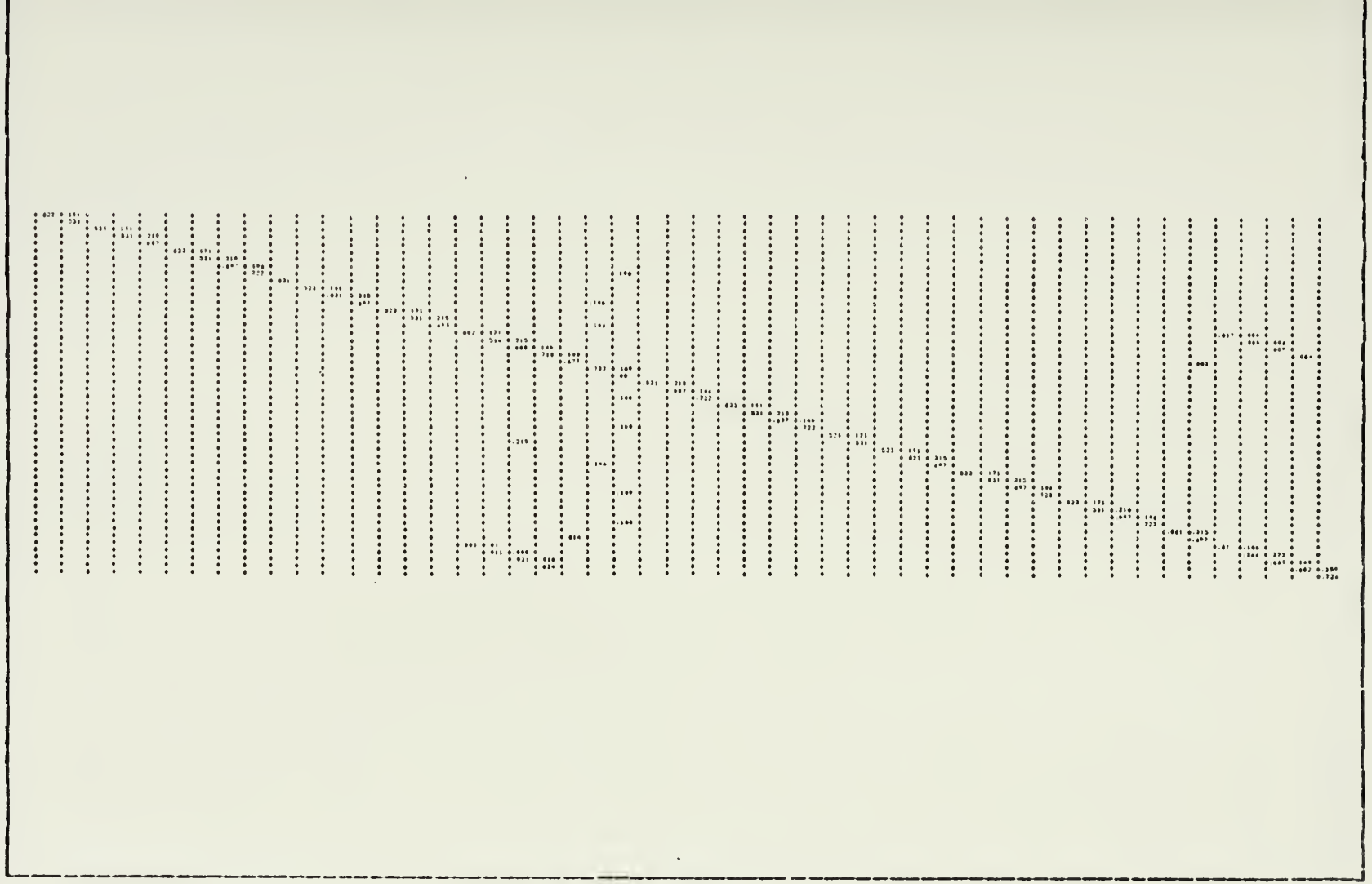


Figure C.11 Transition Matrix for CMF 31

0.523	0.171	0	0
0	0.531	0.215	0
0	0	0.697	0.146
0	0	0	0.722

Figure C.12 Transition Matrix for CMF 33

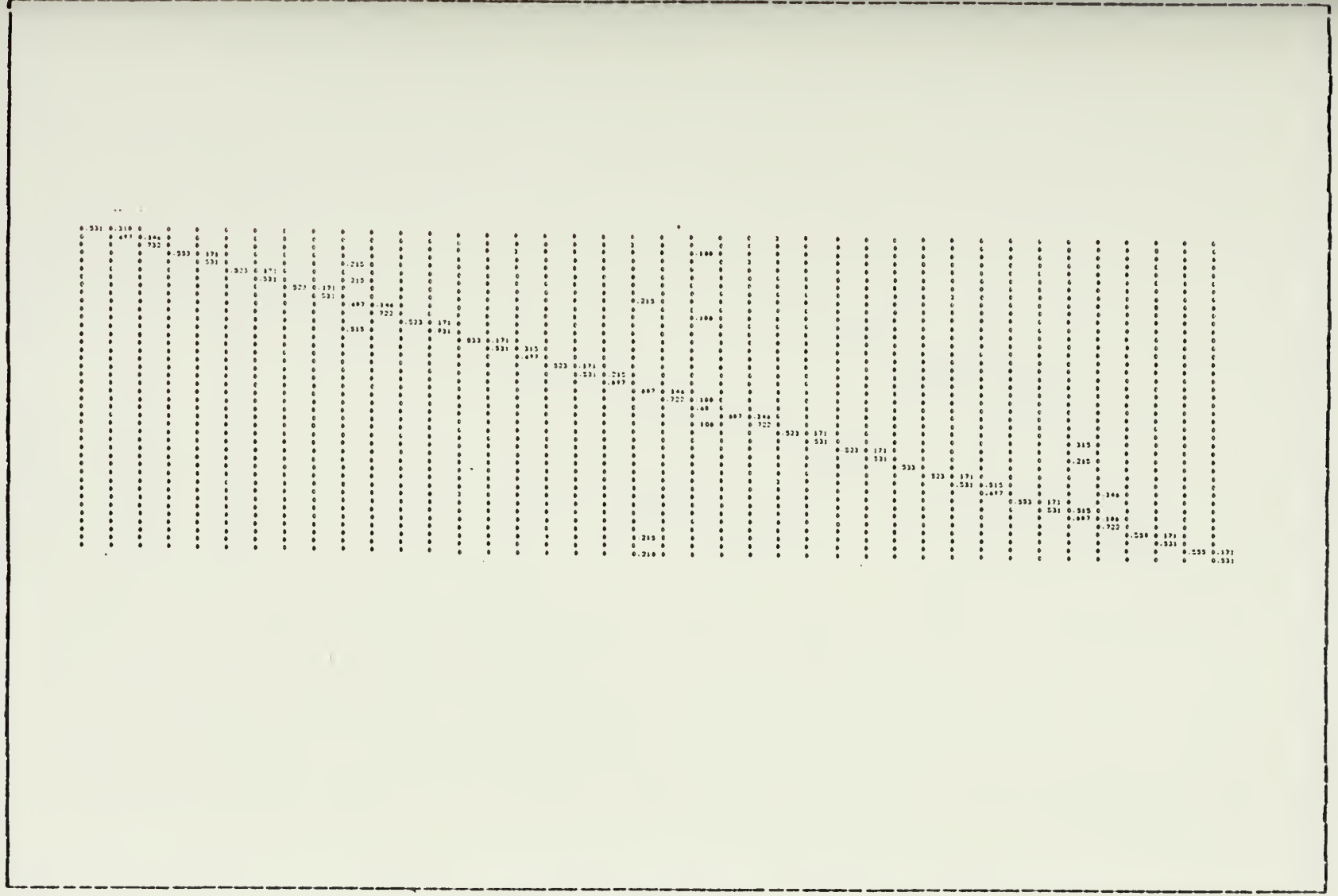
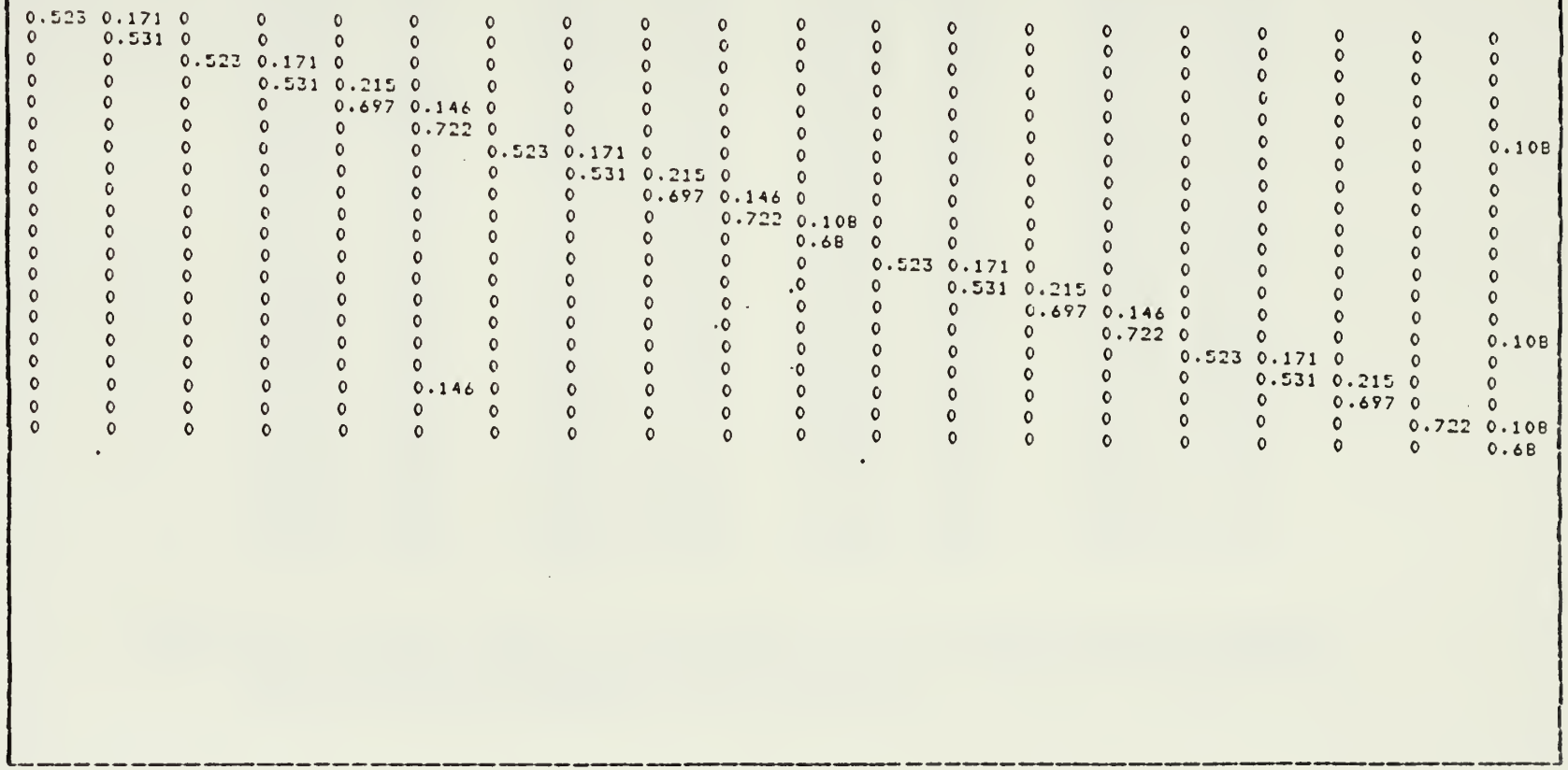


Figure C.13 Transition Matrix for CMF 51

0.531	0.215	0	0	0	0	0	0	0	0	0
0	0.697	0.146	0	0	0	0	0	0	0	0
0	0	0.722	0	0	0	0	0.108	0	0	0
0	0	0	0.502	0.171	0	0	0	0.004	0	0
0	0	0	0	0.516	0.215	0	0	0.009	0.006	0
0	0	0	0	0	0.688	0.146	0	0	0.009	0
0	0	0	0	0	0	0.718	0.108	0	0	0.004
0	0	0	0	0	0	0	0.68	0	0	0
0	0	0	0	0.011	0.008	0	0	0.366	0.273	0
0	0	0	0	0	0.021	0.016	0	0	0.667	0.144
0	0	0	0	0	0	0.024	0	0	0	0.682

Figure C.14 Transition Matrix for CMF 54



0.523	0.171	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0.531	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0.523	0.171	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0.531	0.215	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0.697	0.146	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0.722	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0.523	0.171	0	0	0	0	0	0	0	0	0	0	0	0.108
0	0	0	0	0	0	0	0.531	0.215	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0.697	0.146	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0.722	0.108	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0.68	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0.523	0.171	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0.531	0.215	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0.697	0.146	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.722	0	0	0	0	0.108
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.523	0.171	0	0	0
0	0	0	0	0	0.146	0	0	0	0	0	0	0	0	0	0	0.531	0.215	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.697	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.722	0.108
																			0.68

Figure C.15 Transition Matrix for CMF 55

(1, 1)	0.523	(2, 2)	0.697	(2,27)	0.146	(3, 3)	0.523
(3, 4)	0.171	(4, 4)	0.531	(4, 5)	0.215	(5, 5)	0.697
(6, 6)	0.523	(6, 7)	0.171	(7, 7)	0.531	(7,10)	0.215
(8, 8)	0.523	(8, 9)	0.171	(9, 9)	0.531	(9,10)	0.215
(10,10)	0.697	(10,11)	0.146	(11,11)	0.722	(11,74)	0.108
(12,12)	0.523	(12,13)	0.171	(13,13)	0.531	(13,21)	0.215
(14,14)	0.523	(14,15)	0.171	(15,15)	0.531	(15,45)	0.215
(16,16)	0.523	(17,17)	0.523	(17,18)	0.171	(18,18)	0.531
(18,21)	0.215	(19,19)	0.523	(19,20)	0.171	(20,20)	0.531
(20,21)	0.215	(21,21)	0.697	(21,27)	0.146	(22,22)	0.523
(22,23)	0.171	(23,21)	0.215	(23,23)	0.531	(24,24)	0.523
(24,25)	0.171	(25,25)	0.531	(25,60)	0.215	(26,26)	0.523
(27,27)	0.722	(27,74)	0.108	(28,28)	0.523	(28,29)	0.171
(29,29)	0.531	(29,30)	0.215	(30,30)	0.697	(30,37)	0.146
(31,31)	0.523	(31,32)	0.171	(32,32)	0.531	(32,33)	0.215
(33,33)	0.697	(33,37)	0.146	(34,34)	0.523	(34,35)	0.171
(35,35)	0.531	(35,36)	0.215	(36,36)	0.697	(36,37)	0.146
(37,37)	0.722	(37,74)	0.108	(38,38)	0.523	(38,39)	0.171
(39,39)	0.531	(39,40)	0.215	(40,40)	0.697	(40,41)	0.146
(41,41)	0.722	(41,42)	0.108	(42,42)	0.68	(43,43)	0.523
(43,44)	0.171	(44,44)	0.531	(44,45)	0.215	(45,45)	0.697
(45,46)	0.146	(46,46)	0.722	(46,47)	0.108	(47,47)	0.68
(48,48)	0.523	(49,49)	0.722	(50,50)	0.523	(50,51)	0.171
(51,51)	0.531	(51,60)	0.215	(52,52)	0.523	(52,53)	0.171
(53,53)	0.531	(53,54)	0.215	(54,54)	0.697	(54,55)	0.146
(55,55)	0.722	(55,74)	0.108	(56,56)	0.523	(56,57)	0.171
(57,57)	0.531	(58,58)	0.523	(58,59)	0.171	(59,59)	0.531
(59,60)	0.215	(60,60)	0.697	(60,61)	0.146	(61,61)	0.722
(61,62)	0.108	(62,62)	0.68	(63,63)	0.523	(63,64)	0.171
(64,36)	0.215	(64,64)	0.531	(65,65)	0.523	(65,66)	0.171
(66,66)	0.531	(66,67)	0.215	(67,67)	0.697	(67,68)	0.146
(68,68)	0.722	(68,69)	0.108	(69,69)	0.68	(70,70)	0.523
(70,71)	0.171	(71,60)	0.215	(71,71)	0.531	(72,72)	0.523
(72,73)	0.171	(73,36)	0.215	(73,73)	0.531	(74,74)	0.68

Note: The numbers inside parenthesis are row and column numbers. The corresponding duty positions can be found in Appendix B. Only nonzero elements are indicated.

Figure C.16 Transition Matrix for CMF 63

Figure C.17 Transition Matrix for CMF 64

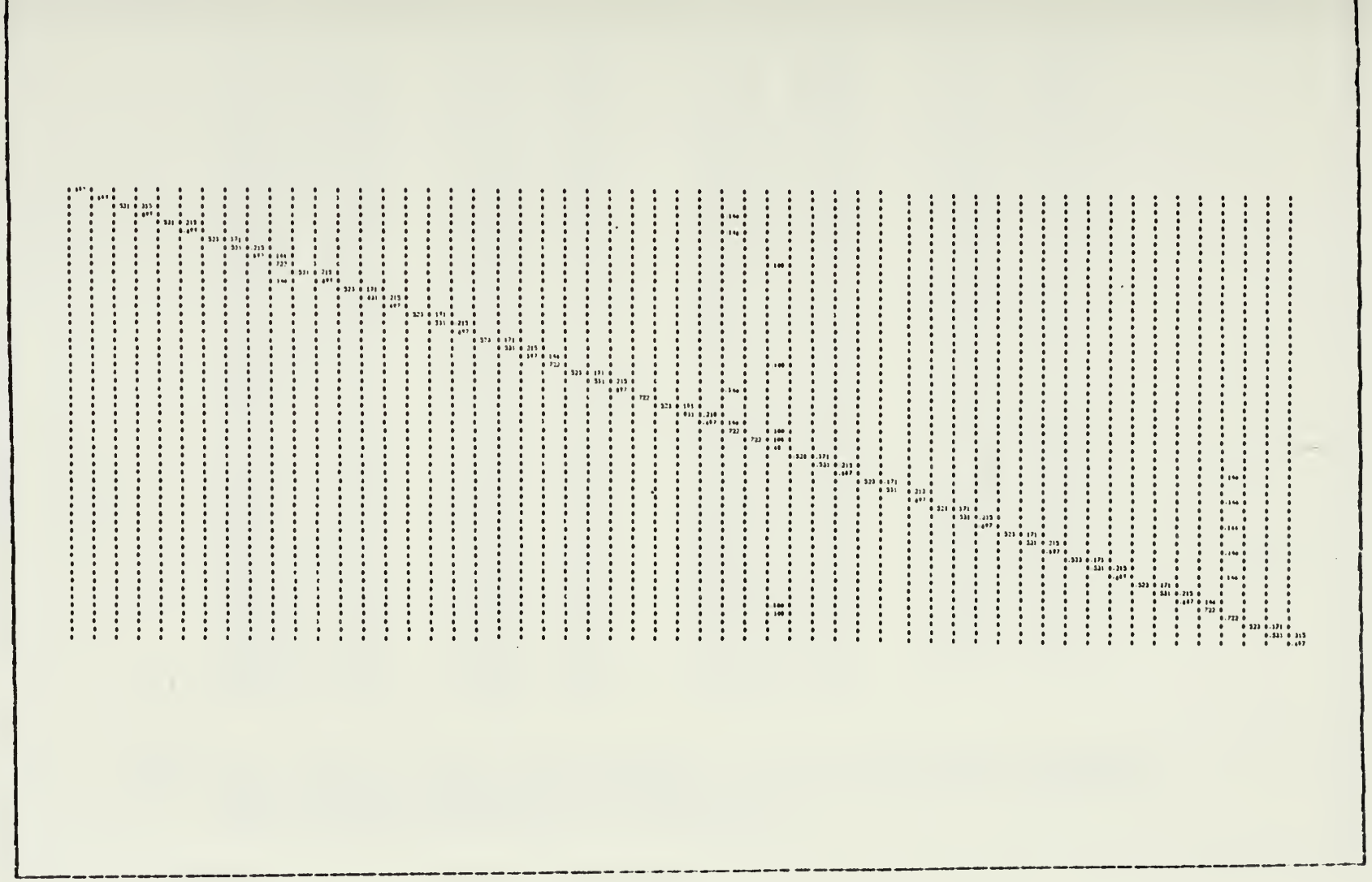


Figure C.18 Transition Matrix for CMF 67

(1, 1)	0.697	(1, 2)	0.146	(2, 2)	0.722	(2, 3)	0.108
(3, 3)	0.68	(4, 4)	0.531	(4, 5)	0.215	(5, 5)	0.697
(5, 6)	0.146	(6, 6)	0.722	(6, 7)	0.108	(7, 7)	0.68
(8, 8)	0.523	(8, 9)	0.171	(9, 9)	0.531	(9,10)	0.215
(10,10)	0.697	(10,11)	0.146	(11,11)	0.722	(11,27)	0.108
(12,12)	0.523	(12,13)	0.171	(13,13)	0.531	(13,14)	0.215
(14,14)	0.697	(15,15)	0.523	(15,16)	0.171	(16,16)	0.531
(16,17)	0.215	(17,17)	0.697	(17,18)	0.146	(18,18)	0.722
(18,19)	0.108	(19,19)	0.68	(20,20)	0.531	(20,21)	0.215
(21,21)	0.697	(21,22)	0.146	(22,22)	0.722	(23,23)	0.502
(23,24)	0.171	(23,60)	0.017	(24,24)	0.516	(24,25)	0.215
(25,25)	0.688	(25,26)	0.146	(26,26)	0.718	(26,27)	0.108
(27,27)	0.677	(28,28)	0.523	(28,29)	0.171	(29,29)	0.531
(29,30)	0.215	(30,30)	0.697	(30,31)	0.146	(31,31)	0.722
(31,32)	0.108	(32,32)	0.68	(33,33)	0.523	(33,34)	0.171
(34,34)	0.531	(34,35)	0.215	(35,35)	0.697	(35,36)	0.146
(36,36)	0.722	(36,41)	0.108	(37,37)	0.523	(37,38)	0.171
(38,38)	0.531	(38,39)	0.215	(39,39)	0.697	(39,40)	0.146
(40,40)	0.722	(40,41)	0.108	(41,41)	0.68	(42,42)	0.502
(42,43)	0.171	(42,61)	0.004	(43,43)	0.516	(43,44)	0.215
(43,61)	0.009	(43,62)	0.006	(44,44)	0.688	(44,58)	0.146
(44,62)	0.009	(45,45)	0.523	(45,46)	0.171	(46,46)	0.531
(46,47)	0.215	(47,47)	0.697	(47,58)	0.146	(48,48)	0.523
(48,49)	0.171	(49,49)	0.531	(49,50)	0.215	(50,50)	0.697
(50,58)	0.146	(51,51)	0.523	(51,52)	0.171	(52,52)	0.531
(52,53)	0.215	(53,53)	0.697	(53,58)	0.146	(54,54)	0.523
(54,55)	0.171	(55,55)	0.531	(55,56)	0.215	(56,56)	0.697
(56,58)	0.146	(57,57)	0.688	(57,58)	0.146	(58,58)	0.718
(58,59)	0.108	(58,63)	0.004	(59,59)	0.677	(59,64)	0.003
(60,23)	0.003	(60,24)	0.01	(60,60)	0.57	(61,43)	0.011
(61,44)	0.008	(61,61)	0.366	(61,62)	0.273	(62,44)	0.021
(62,62)	0.667	(62,63)	0.146	(63,58)	0.024	(63,63)	0.682
(63,64)	0.159	(64,59)	0.014	(64,64)	0.726		

Note: The numbers inside parenthesis are row and column numbers.
The corresponding duty positions can be found in Appendix B.
Only nonzero elements are indicated.

Figure C.19 Transition Matrix for CMF 71

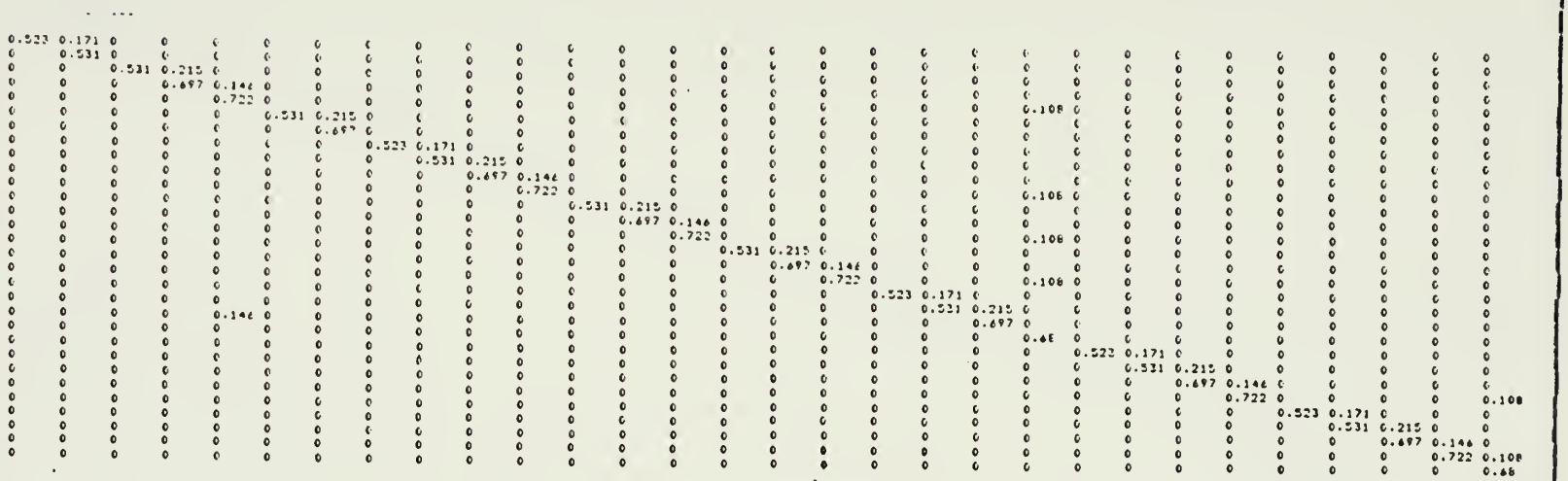


Figure C.20 Transition Matrix for CMF 74

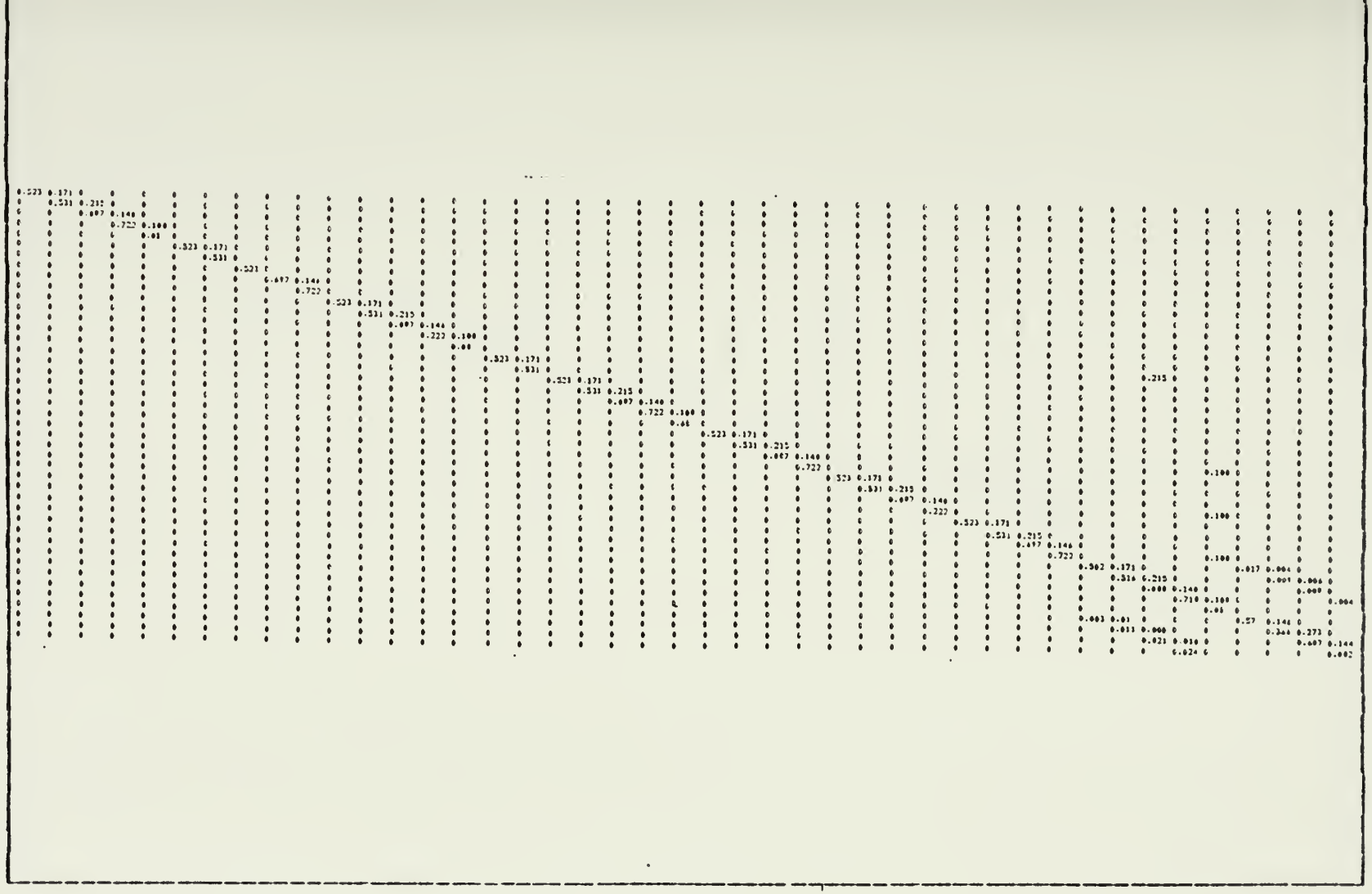


Figure C.21 Transition Matrix for CMF 76

0.697	0.146	0	0	0	0	0	0	0
0	0.722	0.108	0	0	0	0	0	0
0	0	0.68	0	0	0	0	0	0
0	0	0	0.697	0.146	0	0	0	0
0	0	0	0	0.722	0.108	0	0	0
0	0	0	0	0	0.68	0	0	0
0	0	0	0	0	0	0.697	0.146	0
0	0	0	0	0	0	0	0.722	0.108
0	0	0	0	0	0	0	0	0.68

Figure C.22 Transition Matrix for CMF 79

0.523	0	0	0	0	0	0	0	0	0	0	0
0	0.523	0.171	0	0	0	0	0	0	0	0	0
0	0	0.531	0.215	0	0	0	0	0	0	0	0
0	0	0	0.697	0.146	0	0	0	0	0	0	0
0	0	0	0	0.722	0	0	0.108	0	0	0	0
0	0	0	0	0	0.697	0.146	0	0	0	0	0
0	0	0	0	0	0	0.722	0.108	0	0	0	0
0	0	0	0	0	0	0	0.68	0	0	0	0
0	0	0	0	0	0	0	0	0.523	0	0	0
0	0	0	0	0	0	0	0	0	0.523	0.171	0
0	0	0	0	0	0	0	0	0	0	0.531	0.215
0	0	0	0	0	0	0	0	0	0	0	0.697

Figure C.23 Transition Matrix for CMF 81

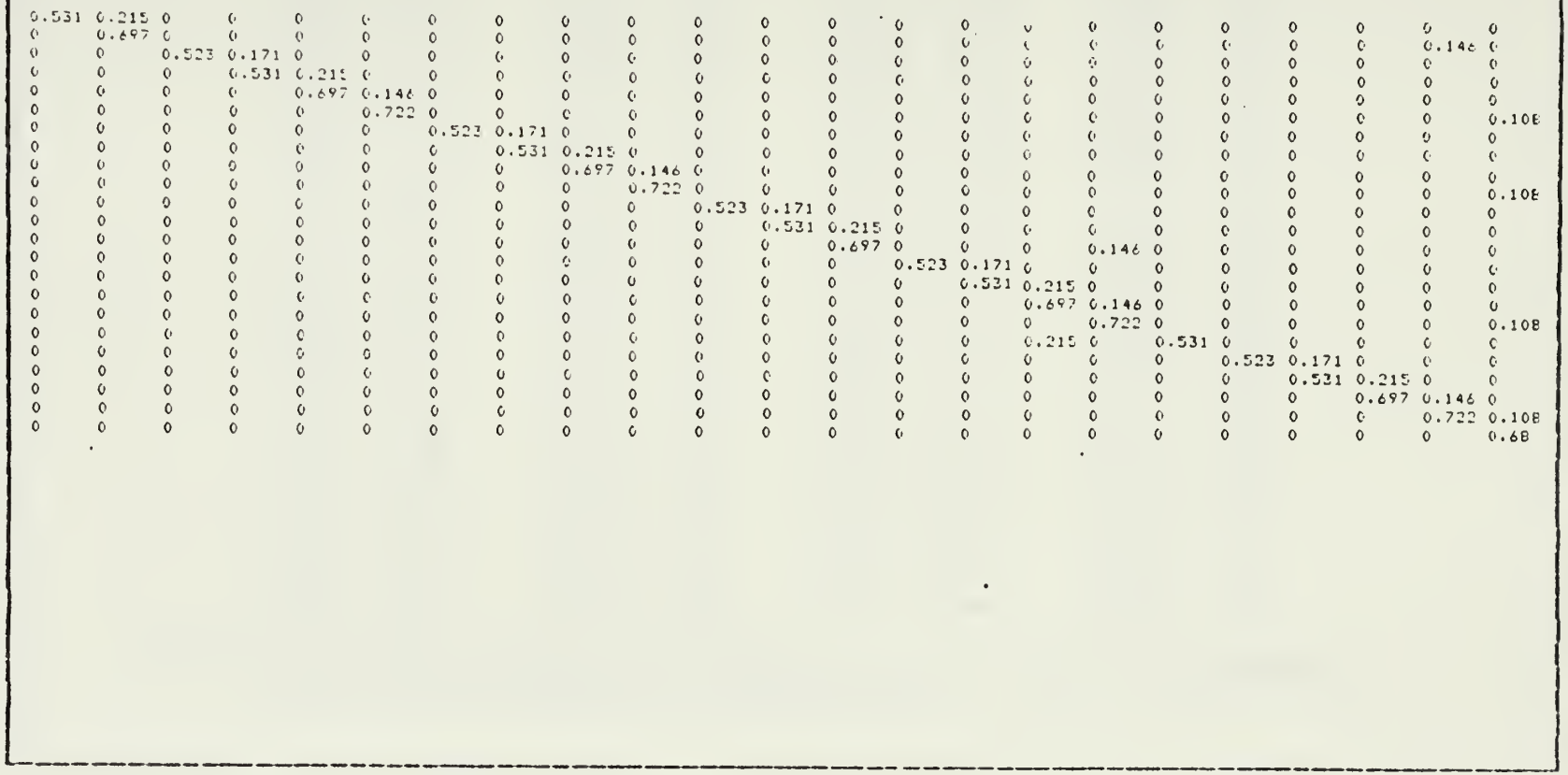


Figure C.24 Transition Matrix for CMF 84

(1, 1)	0.697	(2, 2)	0.523	(2, 3)	0.171	(3, 3)	0.531
(3, 5)	0.215	(4, 4)	0.531	(4, 5)	0.215	(5, 5)	0.697
(5, 6)	0.146	(6, 6)	0.722	(7, 7)	0.697	(8, 8)	0.523
(8, 9)	0.171	(9, 9)	0.531	(9,10)	0.215	(10,10)	0.697
(11,11)	0.523	(11,12)	0.171	(12,12)	0.531	(12,13)	0.215
(13,13)	0.697	(13,14)	0.146	(14,14)	0.722	(15,15)	0.523
(15,16)	0.171	(16,16)	0.531	(16,17)	0.215	(17,17)	0.697
(17,18)	0.146	(18,18)	0.722	(19,19)	0.502	(19,20)	0.171
(19,78)	0.017	(19,79)	0.004	(20,20)	0.516	(20,21)	0.215
(20,79)	0.009	(20,80)	0.006	(21,21)	0.688	(21,22)	0.146
(21,80)	0.009	(22,22)	0.718	(22,23)	0.108	(22,81)	0.004
(23,23)	0.677	(23,82)	0.003	(24,24)	0.523	(24,25)	0.171
(25,25)	0.531	(25,26)	0.215	(26,26)	0.697	(26,27)	0.146
(27,27)	0.722	(27,28)	0.108	(28,28)	0.68	(29,29)	0.523
(29,30)	0.171	(30,30)	0.531	(30,31)	0.215	(31,31)	0.697
(31,32)	0.146	(32,32)	0.722	(32,33)	0.108	(33,33)	0.68
(34,34)	0.523	(34,35)	0.171	(35,35)	0.531	(35,36)	0.215
(36,36)	0.697	(36,37)	0.146	(37,37)	0.722	(38,38)	0.523
(38,39)	0.171	(39,39)	0.531	(39,40)	0.215	(40,40)	0.697
(41,41)	0.523	(41,42)	0.171	(42,42)	0.531	(42,43)	0.215
(43,43)	0.697	(43,44)	0.146	(44,23)	0.108	(44,44)	0.722
(45,45)	0.523	(45,46)	0.171	(46,46)	0.531	(46,47)	0.215
(47,47)	0.697	(48,48)	0.697	(48,49)	0.146	(49,23)	0.108
(49,49)	0.722	(50,50)	0.523	(51,51)	0.523	(51,52)	0.171
(52,52)	0.531	(53,53)	0.523	(53,54)	0.171	(54,54)	0.531
(54,55)	0.215	(55,55)	0.697	(55,56)	0.146	(56,56)	0.722
(57,57)	0.523	(57,58)	0.171	(58,58)	0.531	(58,59)	0.215
(59,59)	0.697	(60,60)	0.523	(60,61)	0.171	(61,61)	0.531
(62,62)	0.722	(63,63)	0.523	(63,64)	0.171	(64,64)	0.531
(64,65)	0.215	(65,65)	0.697	(65,66)	0.146	(66,66)	0.722
(66,67)	0.108	(67,67)	0.68	(68,68)	0.531	(68,69)	0.215
(69,69)	0.697	(70,70)	0.531	(71,71)	0.531	(71,72)	0.215
(72,72)	0.697	(73,23)	0.108	(73,73)	0.722	(74,74)	0.523
(75,75)	0.523	(75,76)	0.171	(76,76)	0.531	(76,77)	0.215
(77,77)	0.697	(78,19)	0.003	(78,20)	0.01	(78,78)	0.57
(78,79)	0.146	(79,20)	0.011	(79,21)	0.008	(79,79)	0.366
(79,80)	0.273	(80,21)	0.021	(80,22)	0.016	(80,80)	0.667
(80,81)	0.144	(81,22)	0.024	(81,81)	0.682	(81,82)	0.159
(82,23)	0.014	(82,82)	0.726				

Note: The numbers inside parenthesis are row and column numbers.
The corresponding duty positions can be found in Appendix B.
Only nonzero elements are indicated.

Figure C.25 Transition Matrix for CMF 91

0.523	0.171	0	0	0	0	0	0	0	0	0	0
0	0.531	0.215	0	0	0	0	0	0	0	0	0
0	0	0.697	0.146	0	0	0	0	0	0	0	0
0	0	0	0.722	0	0	0	0	0.108	0	0	0
0	0	0	0	0.523	0.171	0	0	0	0	0	0
0	0	0	0	0	0.531	0.215	0	0	0	0	0
0	0	0	0	0	0	0.697	0.146	0	0	0	0
0	0	0	0	0	0	0	0.722	0.108	0	0	0
0	0	0	0	0	0	0	0	0.68	0	0	0
0	0	0	0	0	0	0	0	0	0.523	0.171	0
0	0	0	0	0	0	0	0	0	0	0.531	0
0	0	0	0	0	0	0	0	0.108	0	0	0.722

Figure C.26 Transition Matrix for CMF 92

0.502	0.171	0	0	0	0	0	0	0	0.017	0.004	0	0	0
0	0.516	0.215	0	0	0	0	0	0	0	0.009	0.006	0	0
0	0	0.688	0.146	0	0	0	0	0	0	0	0.009	0	0
0	0	0	0.718	0.108	0	0	0	0	0	0	0	0.004	0
0	0	0	0	0.677	0	0	0	0	0	0	0	0	0.003
0	0	0	0	0	0.523	0.171	0	0	0	0	0	0	0
0	0	0	0	0	0	0.531	0.215	0	0	0	0	0	0
0	0	0	0	0	0	0	0.697	0.146	0	0	0	0	0
0	0	0	0	0	0	0	0	0.722	0	0	0	0	0
0.003	0.01	0	0	0	0	0	0	0	0.57	0.146	0	0	0
0	0.011	0.008	0	0	0	0	0	0	0	0.366	0.273	0	0
0	0	0.021	0.016	0	0	0	0	0	0	0	0.667	0.144	0
0	0	0	0.024	0	0	0	0	0	0	0	0	0.682	0.159
0	0	0	0	0.014	0	0	0	0	0	0	0	0	0.726

Figure C.27 Transition Matrix for CHF 94

0.523	0.171	0	0	0	0	0	0	0	0	0	0	0
0	0.531	0.215	0	0	0	0	0	0	0	0	0	0
0	0	0.697	0.146	0	0	0	0	0	0	0	0	0
0	0	0	0.722	0.108	0	0	0	0	0	0	0	0
0	0	0	0	0.68	0	0	0	0	0	0	0	0
0	0	0	0	0	0.523	0.171	0	0	0	0	0	0
0	0	0	0	0	0	0.531	0.215	0	0	0	0	0
0	0	0	0	0	0	0	0.697	0.146	0	0	0	0
0	0	0	0	0	0	0	0	0.722	0	0	0	0
0	0	0	0	0	0	0	0	0	0.531	0.215	0	0
0	0	0	0	0	0	0	0	0	0	0.697	0.146	0
0	0	0	0	0	0	0	0	0	0	0	0.722	0.108
0	0	0	0	0	0	0	0	0	0	0	0	0.68

Figure C.28 Transition Matrix for CMF 95

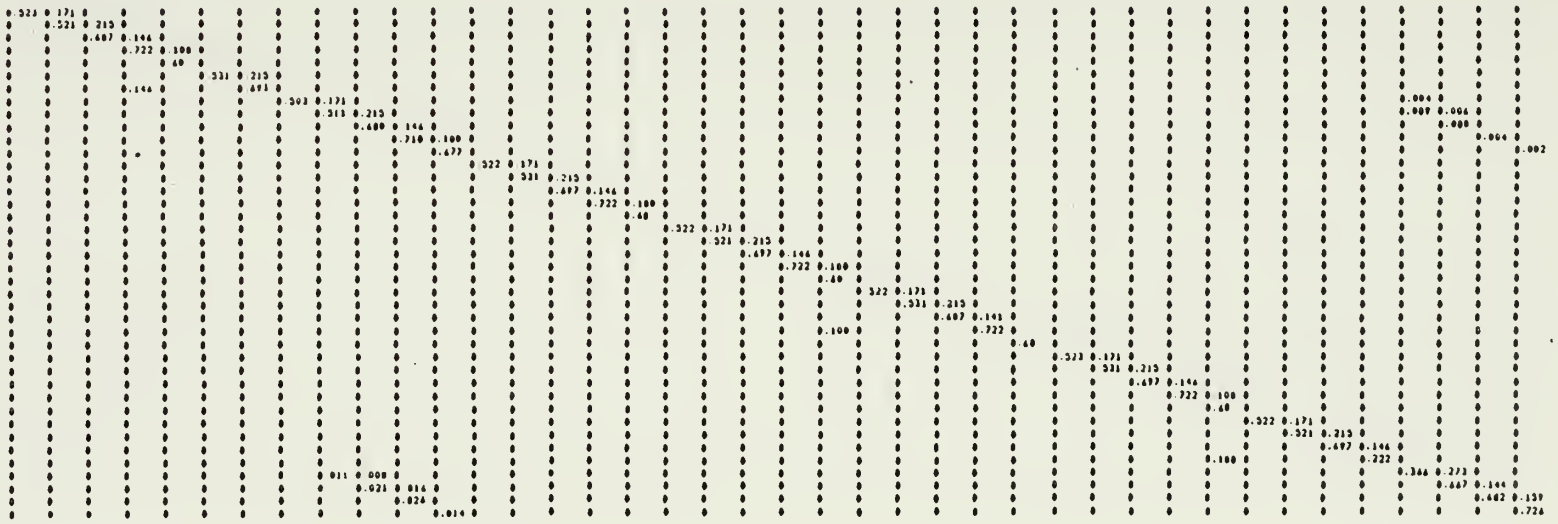


Figure C.29 Transition Matrix for CMF 96

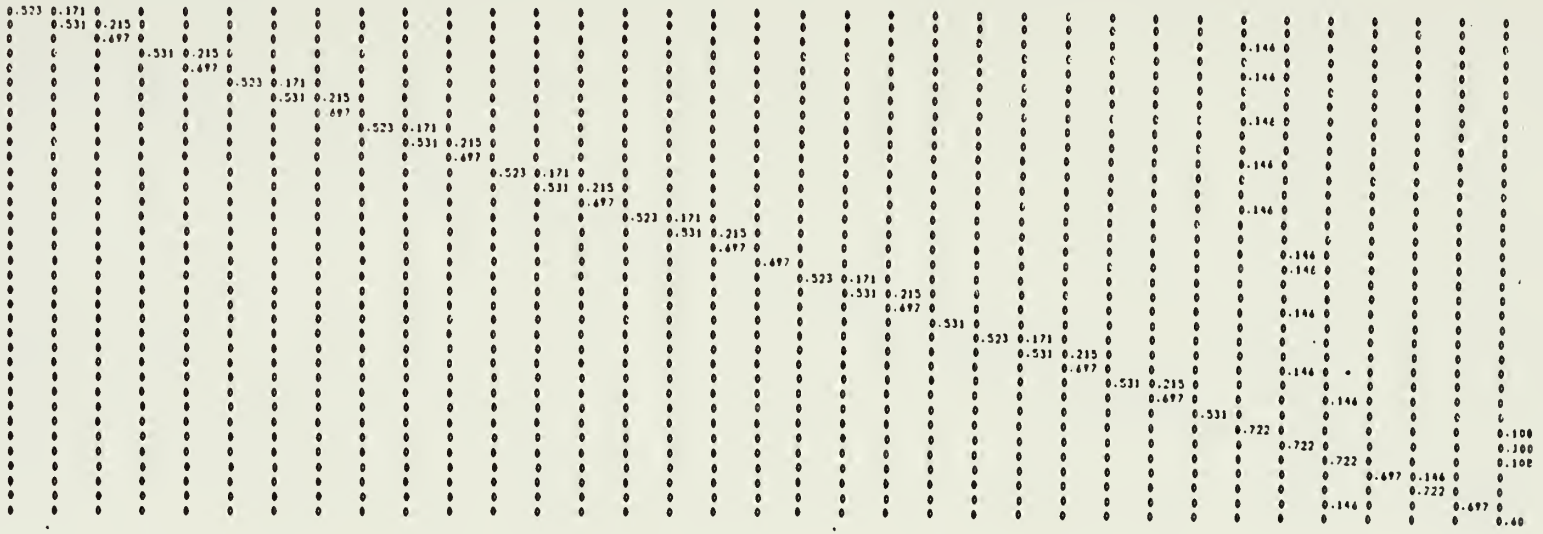


Figure C.30 Transition Matrix for CMF 97

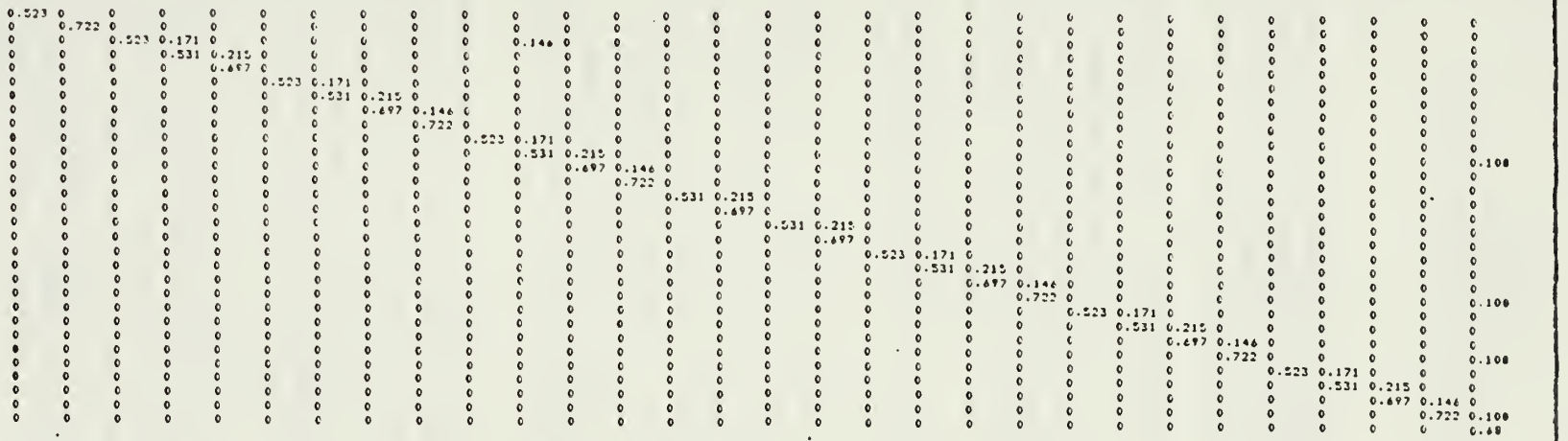


Figure C.31 Transition Matrix for CMF 98

APPENDIX D

SAMPLE TERMINAL SESSIONS

```
      1. DESCRIBE.

THIS WORKSPACE CONTAINS THE NECESSARY  PROGRAMS FOR  PREDICTION OF
TRAINING REQUIREMENTS IN THE AIRBORNE COMMUNITY, IT WAS WRITTEN BY
CAPTAIN D. T. KOUTIANOUDIS IN PARTIAL  FULFILLMENT  OF THE  DEGREE
OF MASTER OF SCIENCE IN OPERATIONS RESEARCH.

   THE MODEL REQUIRES THE DATA TO BE STORED UNDER THE NAMES:
     'PO,,'  FOR NAMES OF DUTY POSITIONS IN CMF ,, ;
     'INV,,' FOR INVENTORIES OF CMF ,, ;
     'M,,'   FOR THE TRANSITION MATRIX FOR CMF ,, ;
     'A,,1'  FOR FIRST YEAR(CURRENT) AUTHORIZATIONS OF CMF ,, ;
     'A,,2'  FOR SECOND YEAR AUTHORIZATIONS OF CMF ,, ;
     'A,,3'  FOR THIRD YEAR AUTHORIZATIONS OF CMF ,, ;
WHERE ',,' IS THE NUMBER OF THE CMF.
TO SEE  ANY OF  THE ABOVE THE USER MAY TYPE ITS NAME; FOR EXAMPLE,
TO SEE CURRENT YEAR AUTHORIZATIONS OF CMF 12 TYPE 'A121'.

    TO DERIVE RESULTS FOR A YEAR ONE SHOULD FOLLOW THE STEPS:
     (1)CREATE VECTORS  OF DATA USING  THE  FUNCTION  'DATAINPUT';
        JUST TYPE 'DATAINPUT'TO CREATE VECTORS FOR ALL CMF WANTED;
        OR UPDATE(ADD A NEW ELEMENT, DELETE AN  EXISTING  ELEMENT,
        CHANGE THE VALUE OF AN ELEMENT) AN EXISTING VECTOR OF DATA
        USING  THE FUNCTION 'DATAMAN';  FOR EXAMPLE, TO UPDATE THE
        VECTOR OF DUTY POSITIONS FOR CMF 12 TYPE 'PO12←DATAMAN';
     (2)CREATE  TRANSITION  MATRICES USING  THE FUNCTION 'MATRIX';
        FOR EXAMPLE, FOR CMF 12 ENTER 'M12←MATRIX PO12';
     (3)RUN THE MODEL BY TYPING THE WORD 'AIRBORNE'.

NOTE: (I) AUTHORIZATIONS  ARE INITIALLY ENTERED FOR YEARS 1, 2, 3.
      AT THE END OF YEAR 1, THE CURRENT YEAR IS YEAR 2. WHEN ASKED
      (WHILE  WORKING  IN  THE  FUNCTION 'DATAINPUT') FOR  CURRENT
      AUTHORIZATIONS, YOU MAY TYPE A,,2. LIKEWISE,  AUTHORIZATION
      FOR THE NEXT YEAR CAN BE UPDATED BY TYPING A,,3.
      (II) ALL  DATA ARE STORED IN COLUMN VECTORS, IF YOU  WANT TO
      SEE THEM IN A ROW, TYPE A COMMA  BEFORE  THE NAME;  E.G. FOR
      INVENTORIES OF CMF 31 TYPE ',INV31'.
      (III) ADDITIONS OR DELETIONS MUST BE MADE IN ALL VECTORS  OF
      A CMF SO THAT  THEIR LENGTHS  ARE  IDENTICAL.
      (IV) IF  YOU CREATE A NEW VECTOR OF DUTY POSITIONS, CHECK IT
      TO BE SURE THAT DUTY POSITIONS ARE ARRANGED IN  ALPHANUMERIC
      ORDER OF MOS, INCREASING ORDER OF SL AND P,V,S ORDER OF SQI.
      (V) AFTER  CREATION  OF  DATA  OR  ANY  CHANGE  BE  SURE  TO
      SAVE YOUR WORK BY TYPING ')SAVE', IF THIS  CHANGE  IS  MEANT
      TO BE PERMANENT.
```

2. Sample Terminal Session of the APL Function "DATAINPUT".

```
      DATAINPUT
THIS FUNCTION IS USED TO CREATE VECTORS OF DUTY POSITIONS,
AUTHORIZATIONS, AND INVENTORIES.


ENTER THE FY (2 DIGITS) FOR WHICH INVENTORIES ARE AVAILABLE:
⎕:
      .84
ENTER CMF NUMBER FOR WHICH YOU WANT TO ENTER DATA; ONE OF
THE FOLLOWING:
11 12 13 16 18 19 23 27 28 29 31 33 51 54 55 63 64 67 71 74 76 79 81
 84 91 92 94 95 96 97 98
⎕:
      .28
ENTER 'PO' TO ENTER DUTY POSITIONS
      'A1' TO ENTER AUTHORIZATIONS OF BEGINNING FY84
      'A2' TO ENTER AUTHORIZATIONS OF BEGINNING FY85
      'A3' TO ENTER AUTHORIZATIONS OF BEGINNING FY86
      'IN' TO ENTER INVENTORIES OF BEGINNING FY84
 :
.PO
THE SEQUENCE OF NAMES OF DUTY POSITIONS SEPARATED BY A BLANK SPACE
MUST BE ENTERED IN QUOTES, FOR EXAMPLE,'11B10P 11B20P ... 11C40V';
IF NAMES DO NOT FIT IN ONE LINE TO CONTINUE IN NEXT LINE TYPE(AFTER
THE LAST NAME) A SPACE FOLLOWED BY ',⎕  BEFORE PRESSING ENTER.


ENTER NAMES OF DUTY POSITIONS (INSIDE QUOTES) FOR CMF 28
⎕:
      .'28F10P 28F20P 28F30P 28F40P 28K20P 28K40P'
DO YOU WANT TO ENTER MORE DATA? ENTER Y OR N
.Y
ENTER CMF NUMBER FOR WHICH YOU WANT TO ENTER DATA; ONE OF
THE FOLLOWING:
11 12 13 16 18 19 23 27 28 29 31 33 51 54 55 63 64 67 71 74 76 79 81
84 91 92 94 95 96 97 98
⎕:
      .28
ENTER 'PO' TO ENTER DUTY POSITIONS
      'A1' TO ENTER AUTHORIZATIONS OF BEGINNING FY84
      'A2' TO ENTER AUTHORIZATIONS OF BEGINNING FY85
      'A3' TO ENTER AUTHORIZATIONS OF BEGINNING FY86
      'IN' TO ENTER INVENTORIES OF BEGINNING FY84
 :
.IN
THE SEQUENCE OF DATA NUMBERS MUST BE SEPARATED BY  A BLANK  SPACE
OR COMMA, IF DATA DO NOT FIT IN ONE LINE TO CONTINUE IN NEXT LINE
TYPE ,⎕ BEFORE PRESSING ENTER.


ENTER INVENTORIES FOR FY84 AND CMF 28
⎕:
      .43 267 12 67 76 198
DO YOU WANT TO ENTER MORE DATA? ENTER Y OR N
.N
```

3. Sample Terminal Session of the APL Function "DATAMAN".

```
      ,PO28
28F10P 28F20P 28F30P 28F40P 28K20P 28K40P
      PO28←DATAMAN
THIS FUNCTION DOES THE FOLLOWING:
ADDITION OF AN ELEMENT, DELETION OF AN ELEMENT, AND REPLACEMENT OF
THE VALUE OF AN ELEMENT IN AN EXISTING VECTOR OF DATA.

ENTER THE NAME OF VECTOR YOU WANT TO CHANGE
□:
      ,PO28
ENTER A, D, OR R TO ADD A NEW ELEMENT, DELETE AN EXISTING
ELEMENT, OR REPLACE THE VALUE OF AN ELEMENT RESPECTIVELY:
,A
ENTER LINE NUMBER AFTER WHICH YOU WANT TO ADD A LINE
□:
      ,5
ENTER THE NAME OF THE NEW DUTY POSITION(IN QUOTES)
□:
      ,'28K30P'
MORE CHANGES? ENTER Y OR N
,Y
ENTER A, D, OR R TO ADD A NEW ELEMENT, DELETE AN EXISTING
ELEMENT, OR REPLACE THE VALUE OF AN ELEMENT RESPECTIVELY:
,D
ENTER POSITION OF LINE YOU WANT TO DELETE
□:
      ,1
MORE CHANGES? ENTER Y OR N
,Y
ENTER A, D, OR R TO ADD A NEW ELEMENT, DELETE AN EXISTING
ELEMENT, OR REPLACE THE VALUE OF AN ELEMENT RESPECTIVELY:
,R
ENTER POSITION WHOSE VALUE HAS TO CHANGE
□:
      ,6
ENTER NEW NAME IN QUOTES
□:
      ,'28R50P'

MORE CHANGES? ENTER Y OR N
,N
      ,PO28
28F20P 28F30P 28F40P 28K20P 28K30P 28R50P
```

4. Sample Terminal Session of the APL Function "MATRIX".

```
      M11←MATRIX PO11
THIS FUNCTION PRODUCES TRANSITION MATRICES, TO GET CORRECT RESULTS
ELEMENTS  OF THE  ARGUMENT (VECTOR  OF DUTY  POSITIONS) MUST BE IN
ALPHANUMERIC  ORDER OF MOS, INCREASING ORDER OF SL AND P,V,S ORDER
OF SQI.

ARE THERE ANY CHANGES IN MOS DUE TO PROMOTIONS IN THIS CMF?
ENTER Y OR N
.Y
ENTER MOS/SL FROM WHICH THE PROMOTION ORIGINATES(E.G.11H40);
IF YOU ARE FINISHED ENTER F:
.11C40
ENTER MOS/SL TO WHICH THE PROMOTION IS MADE(E.G.11B50):
.11B50
ENTER MOS/SL FROM WHICH THE PROMOTION ORIGINATES(E.G.11H40);
IF YOU ARE FINISHED ENTER F:
.11H40
ENTER MOS/SL TO WHICH THE PROMOTION IS MADE(E.G.11B50):
.11B50
ENTER MOS/SL FROM WHICH THE PROMOTION ORIGINATES(E.G.11H40);
IF YOU ARE FINISHED ENTER F:
.11M40
ENTER MOS/SL TO WHICH THE PROMOTION IS MADE(E.G.11B50):
.11B50
ENTER MOS/SL FROM WHICH THE PROMOTION ORIGINATES(E.G.11H40);
IF YOU ARE FINISHED ENTER F:
.F
```

5. Sample Terminal Session of the APL Function "AIRBORNE".

```
      AIRBORNE
IN ORDER TO USE THE MODEL YOU  NEED THE FOLLOWING INPUT:
(1) VECTORS OF NAMES OF DUTY POSITIONS FOR EACH CMF  STORED UNDER THE
    NAME 'PO,,', WHERE ',,' IS THE  CMF NUMBER, THE INDIVIDUAL DUTY
    POSITIONS  ARE ARRANGED IN  ALPHANUMERIC ORDER OF MOS, INCREASING
    ORDER OF SL, AND P,V,S ORDER OF SQI,
(2) VECTORS OF AUTHORIZATIONS  FOR  TWO  OR  THREE FISCAL  YEARS  AND
    VECTORS OF INVENTORIES FOR THE FIRST  FISCAL  YEAR FOR  EACH  CMF
    CORRESPONDING TO THE DUTY POSITIONS GIVEN ABOVE, THESE ARE STORED
    UNDER THE NAMES: A,,1, A,,2, A,,3 AND INV,, EACH OF WHICH  CAN BE
    CREATED  USING  THE  FUNCTION 'DATAINPUT', OR UPDATED  USING  THE
    FUNCTION 'DATAMAN',
(3) A TRANSITION MATRIX FOR EACH CMF,THIS MATRIX CAN BE CREATED USING
    THE FUNCTION 'MATRIX'; E,G, FOR CMF 11 TYPE:'M11←MATRIX PO11'

DO YOU WANT TO ENTER DATA?  ENTER Y OR N
.Y
INPUT DESIRED NUMBER OF FY'S FOR WHICH YOU WANT
TRAINING REQUIREMENTS (1 OR 2).
□:
      .2
IDENTIFY CMF'S YOU WANT TO WORK WITH (E,G, 11 13 ETC,)
TYPING 'ALL' WILL PROVIDE CMF'S:11 12 13 16 18 19 23 27 28 29 31 33
51 54 55 63 64 67 71 74 76 79 81 84 91 92 94 95 96 97 98
□:
      .ALL
IDENTIFY CMF NUMBERS FOR WHICH YOU WOULD LIKE TO SEE THE DATA:
(YOU CAN ENTER 'ALL', ENTERING 0 YOU WILL SEE NONE,)
□:
      .12 94
ENTER THE FY  TO WHICH THE CURRENT INVENTORY REFERS: (2 DIGITS)
□:
      .84
CMF12
DUTY       AUTHORIZATIONS  INVENTORY
POSITION   FY84 FY85 FY86     FY84
--------   ---- ---- ----     ----
12B10P      366  366  366      424
12B20P      107  107  107      159
12B30P       61   61   61      121
12B40P       21   23   23       93
12C10P        0    0    0        1
12C30P        0    0    0        1
12C40P        0    0    0        1
12E10P        0    0    0        2
12E20P        0    0    0        3
12E30P        0    0    0        4
12E40P        0    0    0        4
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12F10P        0     0     0         2
12F20P        0     0     0         3
12F30P        0     0     0         4
12F40P        0     0     0         1
12F50P       12     8     8        43
12B10V        0     0     0         1
12B20V        0     0     0         1
12B30V        0     0     0         2
12B40V        0     0     0         4
DO YOU WANT TO CONTINUE WITH MODEL(ENTER Y) OR QUIT (ENTER N)?
,Y


CMF94
DUTY       AUTHORIZATIONS   INVENTORY
POSITION   FY84 FY85 FY86      FY84
--------   ---- ---- ----      ----
94B10P      427  450  414       338
94B20P      113  115  101        98
94B30P      105  106   92       125
94B40P       86  100   95       119
94B50P       12   13   12        33
94F10P        0    0    0         2
94F20P        0    0    0         2
94F30P        0    0    0         2
94F40P        0    0    0         1
94B10V        0    0    0         2
94B20V        2    2    2         0
94B30V        2    2    2         0
94B40V        2    2    2         1
94B50V        0    0    0         1
DO YOU WANT TO CONTINUE WITH MODEL(ENTER Y) OR QUIT (ENTER N)?
,Y


INPUT COMPLETION RATES FOR P,V,S (3 NUMBERS BETWEEN 0 AND 1)
?:
      ..79 .68 .43
INPUT COST OF 1 TRAINEE IN P,V,S (3 NUMBERS)
?:
      .45 113 121
ENTER AVAILABLE BUDGET FOR EACH YEAR(2 NUMBER(S))
IN DOLLARS (IN ONE LINE)
?:
      .1042000 1042000
INPUT SCHOOL CAPACITY FOR P, V, S (3 NUMBERS)
?:
      .20000 1000 1200
```

```
DO YOU WANT TO SEE REQUIRED SCHOOL CAPACITY AND BUDGET TO CREATE INVENTORY
UP TO A MINIMUM PERCENTAGE COVERAGE OF AUTHORIZATIONS AT END OF FY84?
ENTER Y OR N
,Y
ENTER MINIMUM PERCENTAGE COVERAGE OF AUTHORIZATIONS REQUIRED
FOR EACH SQI; E,G,  .98 .9 .85 OF AUTHORIZATIONS TO BE COVERED
FOR F, V, AND S POSITIONS,
0:
      .1 .99 .95
REQUIRED SCHOOL CAPACITIES TO ACHIEVE THIS COVERAGE AT THE END OF FY84 ARE:
8389 69 1597
FOR F, V, S RESPECTIVELY


FOR FY84 A BUDGET OF 578539 DOLLARS
IS NEEDED TO COVER AUTHORIZATIONS UP TO THE ABOVE SPECIFIED LEVEL


DO YOU WANT TO SEE REQUIRED BUDGET AND SCHOOL CAPACITY FOR A
DIFFERENT PERCENTAGE COVERAGE? ENTER Y OR N
,Y
ENTER MINIMUM PERCENTAGE COVERAGE OF AUTHORIZATIONS REQUIRED
FOR EACH SQI; E,G,  .98 .9 .85 OF AUTHORIZATIONS TO BE COVERED
FOR F, V, AND S POSITIONS,
0:
     .1 1 1
REQUIRED SCHOOL CAPACITIES TO ACHIEVE THIS COVERAGE AT THE END OF FY84 ARE:
8389 70 1811
FOR F, V, S RESPECTIVELY


FOR FY84 A BUDGET OF 604546 DOLLARS
IS NEEDED TO COVER AUTHORIZATIONS UP TO THE ABOVE SPECIFIED LEVEL


DO YOU WANT TO SEE REQUIRED BUDGET AND SCHOOL CAPACITY FOR A
DIFFERENT PERCENTAGE COVERAGE? ENTER Y OR N
,N



DO YOU WANT TO CONTINUE WITH ORIGINAL BUDGET? ENTER Y OR N
,Y
DO YOU WANT TO CONTINUE WITH ORIGINAL SCHOOL CAPACITY? ENTER Y OR N
,Y


DO YOU WANT TO SEE THE RESULTS FOR FY84 (ENTER Y) OR QUIT(ENTER N)?
,Y
```

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**********************************************
*                                            *
* THE RESULTS  FOR FY84 ARE THE FOLLOWING:   *
*                                            *
**********************************************

BINDING CONSTRAINT IS BUDGET;
REMAINING BUDGET FOR THIS YEAR IS:20 DOLLARS.
REMAINING SCHOOL CAPACITIES FOR P, V, S ARE:  624  780    0.
THE MAX UNCOVERED PERCENTAGES OF PREDICTED SHORTAGE FOR FY85
FOR P,V,AND S RESPECTIVELY WILL BE LESS THAN:
-0.516 -0.5145 0.1744
(NEGATIVE NUMBERS INDICATE SURPLUSES)
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CMF 11
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DUTY POSITION	AUTHORIZED PERSONNEL FY84	AUTHORIZED PERSONNEL FY85	SHORTAGE START OF FY84	NET REQUIREMENTS FOR FY85	TRAINING ENTRANTS IN FY84	RECRUITMENT (TRAINING GRADUATES)
11B10P	4306	4285	-1916	1161	4269	3373
11B20P	676	679	-768	-1136	0	0
11B30P	621	637	-444	-415	0	0
11B40P	249	246	-567	-505	0	0
11B50P	137	137	-311	-275	0	0
11C10P	573	573	-590	-11	361	285
11C20P	224	224	10	-86	38	30
11C30P	14	15	-106	-114	0	0
11C40P	47	47	-74	-58	0	0
11H10P	523	361	-123	23	265	209
11H20P	87	60	-146	-174	0	0
11H30P	92	64	-55	-89	0	0
11H40P	22	13	-39	-53	0	0
11M10P	0	0	-7	-4	0	0
11M20P	0	0	-2	-2	0	0
11M30P	0	0	-4	-3	0	0
11M40P	0	0	-3	-3	0	0
11B10V	58	59	-190	-188	0	0
11B20V	142	141	-173	-48	37	25
11B30V	220	234	-73	-66	81	55
11B40V	83	84	-124	-103	0	0
11B50V	31	34	-36	-50	0	0
11C10V	0	0	-17	-29	0	0
11C20V	6	6	-13	-10	0	0
11C30V	6	6	-9	-12	0	0
11C40V	0	0	-9	-9	0	0

CMF 12

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DUTY POSITION	AUTHORIZED PERSONNEL FY84	AUTHORIZED PERSONNEL FY85	SHORTAGE START OF FY84	NET REQUIREMENTS FOR FY85	TRAINING ENTRANTS IN FY84	RECRUITMENT (TRAINING GRADUATES)
12B10P	366	366	-58	153	433	342
12B20P	107	107	-52	-48	10	8
12B30P	61	61	-60	-56	0	0
12B40P	21	23	-72	-62	0	0
12C10P	0	0	-1	-1	0	0
12C30P	0	0	-1	-1	0	0
12C40P	0	0	-1	-1	0	0
12E10P	0	0	-2	-1	0	0
12E20P	0	0	-3	-2	0	0
12E30P	0	0	-4	-3	0	0
12E40P	0	0	-4	-3	0	0
12F10P	0	0	-2	-1	0	0
12F20P	0	0	-3	-2	0	0
12F30P	0	0	-4	-3	0	0
12Z40P	0	0	-1	-1	0	0
12Z50P	12	9	-31	-32	0	0
12B10V	0	0	-1	-8	0	0
12B20V	0	0	-1	-4	0	0
12B30V	0	0	-2	-4	0	0
12B40V	0	0	-4	-3	0	0

CMF 13

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DUTY POSITION	AUTHORIZED PERSONNEL FY84	AUTHORIZED PERSONNEL FY85	SHORTAGE START OF FY84	NET REQUIREMENTS FOR FY85	TRAINING ENTRANTS IN FY84	RECRUITMENT (TRAINING GRADUATES)
13B10P	526	529	-146	178	571	451
13B20P	73	73	-96	-132	0	0
13B30P	62	63	-64	-61	0	0
13B40P	24	24	-61	-56	0	0
13C10P	4	8	1	6	13	10
13C20P	1	6	-1	4	10	8
13C30P	0	0	-3	-3	0	0
13C40P	9	8	-20	-13	0	0
13E10P	66	56	-26	8	47	37
13E20P	16	23	-23	-13	0	0
13E30P	19	16	-1	-6	3	2
13E40P	0	3	0	0	2	2
13F10P	207	213	-43	87	250	198
13F20P	115	121	-7	15	99	78
13F30P	41	44	-34	-34	0	0
13F40P	15	17	-32	-28	0	0
13B10P	29	29	20	24	50	40
13B20P	7	7	4	4	10	8

13B30P	6	2	-1	-4	0	0
13W50P	8	7	4	-6	5	4
13Y50P	20	7	-23	-40	0	0
13Z50P	3	3	-2	-4	0	0
15D10P	0	0	-1	-1	0	0
15D20P	0	0	-1	-1	0	0
15D30P	0	0	-2	-2	0	0
15D40P	0	0	-2	-2	0	0
15E10P	0	0	-2	-1	0	0
15E20P	0	0	-2	-1	0	0
15E30P	0	0	-4	-3	0	0
15E40P	0	0	-1	-1	0	0
15J10P	0	0	-2	-1	0	0
15J20P	0	0	-2	-1	0	0
15J30P	0	0	-1	-1	0	0
17B10P	2	3	-3	0	2	2
17B20P	1	1	0	0	1	1
17B30P	1	1	-3	-2	0	0
17B40P	1	1	-5	-5	0	0
17C10P	30	35	-6	16	43	34
17C20P	18	18	0	2	15	12
17C30P	8	8	1	-1	4	3
17C40P	6	6	4	4	9	7
82C10P	33	34	-21	6	30	24
82C20P	14	17	1	1	13	10
82C30P	6	6	-19	-14	0	0
82C40P	5	5	-12	-11	0	0
93F10P	11	11	5	8	17	13
93F20P	4	4	-3	-1	2	2
93F30P	2	2	-3	-3	0	0
93F40P	2	2	-2	-2	0	0
13F10V	0	0	-4	-7	0	0
13F20V	18	18	-4	7	24	16
13F30V	8	8	0	-5	0	0
13F40V	2	2	-7	-5	0	0

CMF 16

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DUTY POSITION	AUTHORIZED PERSONNEL FY84	AUTHORIZED PERSONNEL FY85	SHORTAGE START OF FY84	NET REQUIREMENTS FOR FY85	TRAINING ENTRANTS IN FY84	RECRUITMENT (TRAINING GRADUATES)
16B20P	0	0	-2	-1	0	0
16B30P	0	0	-3	-3	0	0
16B40P	0	0	-8	-7	0	0
16C10P	0	0	-1	-1	0	0
16C20P	0	0	-1	-1	0	0
16C30P	0	0	-3	-2	0	0
16D10P	0	0	-3	-2	0	0
16D20P	0	0	-5	-3	0	0
16D30P	0	0	-2	-2	0	0
16D40P	0	0	-1	-1	0	0

16E20P	0	0	-1	-1	0	0
16E30P	0	0	-1	-1	0	0
16H10P	9	9	4	6	14	11
16H20P	3	3	-5	-2	0	0
16H30P	4	4	0	-1	2	2
16H40P	4	4	-10	-8	0	0
16J10P	8	8	-8	0	6	5
16J20P	8	8	3	3	10	8
16J30P	8	8	2	3	10	8
16P10P	0	0	-1	-1	0	0
16P20P	0	0	-2	-1	0	0
16P30P	0	0	-9	-7	0	0
16R10P	144	208	-33	115	282	223
16R20P	48	72	7	20	73	58
16R30P	53	79	-3	31	91	72
16R40P	13	19	-25	-18	0	0
16S10P	72	213	-90	128	302	239
16S20P	71	50	39	5	49	39
16S30P	15	26	-9	2	20	16
16S40P	0	7	-7	-2	3	2
16Z50P	7	3	-18	-21	0	0

CMF 18

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DUTY POSITION	AUTHORIZED PERSONNEL FY84	AUTHORIZED PERSONNEL FY85	SHORTAGE START OF FY84	NET REQUIREMENTS FOR FY85	TRAINING ENTRANTS IN FY84	RECRUITMENT (TRAINING GRADUATES)
18B10S	6	6	-176	-64	0	0
18B20S	7	9	-133	-130	0	0
18B30S	102	103	-309	-255	0	0
18B40S	398	513	-53	68	0	0
18C10S	0	0	-18	-7	0	0
18C20S	135	12	72	-23	167	72
18C30S	29	29	-112	-101	0	0
18C40S	152	209	32	84	111	48
18D10S	6	8	-50	-14	0	0
18D20S	6	7	-81	-55	0	0
18D30S	180	237	34	93	121	52
18D40S	160	218	50	100	145	62
18E10S	77	109	-19	72	124	53
18E20S	216	272	78	171	288	124
18E30S	47	48	-61	-92	0	0
18E40S	213	282	80	154	244	105
18Z50S	523	570	-162	-49	0	0

CMF 19

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DUTY POSITION	AUTHORIZED PERSONNEL FY84	AUTHORIZED PERSONNEL FY85	SHORTAGE START OF FY84	NET REQUIREMENTS FOR FY85	TRAINING ENTRANTS IN FY84	RECRUITMENT (TRAINING GRADUATES)
19D10P	20	31	-44	-2	18	14
19D20P	3	6	-49	-33	0	0

19D30P	6	9	-42	-36	0	0
19D40P	11	12	-22	-19	0	0
19E10P	130	135	-54	39	138	109
19E20P	51	51	0	-8	24	19
19E30P	37	37	-36	-25	0	0
19E40P	1	1	-43	-41	0	0
19K30P	0	0	-7	-5	0	0
19K40P	0	0	-6	-5	0	0
19Z50P	12	12	-29	-25	0	0

CMF 23

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DUTY POSITION	AUTHORIZED PERSONNEL FY84	AUTHORIZED PERSONNEL FY85	SHORTAGE START OF FY84	NET REQUIREMENTS FOR FY85	TRAINING ENTRANTS IN FY84	RECRUITMENT (TRAINING GRADUATES)
22N30P	0	0	-3	-2	0	0
23W50P	0	0	-1	-1	0	0
24C40P	0	0	-1	-1	0	0
24E30P	0	0	-1	-1	0	0
24H20P	0	0	-3	-2	0	0
24H30P	0	0	-2	-2	0	0
24J20P	0	0	-1	-1	0	0
24J30P	0	0	-1	-1	0	0
24K20P	0	0	-1	-1	0	0
24K30P	0	0	-3	-2	0	0
24L30P	0	0	-2	-1	0	0
24F30P	0	0	-2	-1	0	0
24Q10P	0	0	-1	-1	0	0
24Q30P	0	0	-1	-1	0	0
24Q40P	0	0	-1	-1	0	0
24R40P	0	0	-2	-2	0	0
24R50P	0	0	-1	-1	0	0
24T30P	0	0	-3	-2	0	0
24T40P	0	0	-1	-1	0	0
24U20P	0	0	-2	-1	0	0
24U30P	0	0	-2	-2	0	0
24U40P	0	0	-1	-1	0	0
24V40P	0	0	-2	-3	0	0
25L20P	0	0	-2	-1	0	0
25L30P	0	0	-1	-1	0	0
25L40P	0	0	-2	-2	0	0
26H20P	0	0	-2	-1	0	0
26H30P	0	0	-2	-2	0	0

CMF 27

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DUTY POSITION	AUTHORIZED PERSONNEL FY84	AUTHORIZED PERSONNEL FY85	SHORTAGE START OF FY84	NET REQUIREMENTS FOR FY85	TRAINING ENTRANTS IN FY84	RECRUITMENT (TRAINING GRADUATES)
24M10P	8	12	-2	7	17	13
24M20P	6	8	2	4	12	9

24M30P	6	7	-1	1	6	5
24M40P	5	6	-3	-1	3	2
27B10P	4	4	4	4	8	6
27B20P	2	2	-5	-2	0	0
27B30P	0	0	-1	-2	0	0
27B40P	2	2	-4	-4	0	0
27E10P	28	25	7	14	35	28
27E20P	12	10	-1	0	7	6
27E30P	1	1	-10	-9	0	0
27F10P	11	17	5	14	29	23
27F20P	4	6	-5	0	4	3
27F30P	4	4	1	0	3	2
27G20P	0	0	-2	-1	0	0
27G30P	0	0	-1	-1	0	0
27G40P	2	1	-2	-2	0	0
27H10P	4	4	3	3	7	6
27H20P	4	4	3	3	7	6
27H30P	1	1	1	1	2	2
27N10P	6	0	0	-3	0	0
27N20P	2	0	0	-2	0	0
27Z50P	4	3	-2	-3	0	0
46M30P	0	0	-1	-1	0	0

CMF 28

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DUTY POSITION	AUTHORIZED PERSONNEL FY84	AUTHORIZED PERSONNEL FY85	SHORTAGE START OF FY84	NET REQUIREMENTS FOR FY85	TRAINING ENTRANTS IN FY84	RECRUITMENT (TRAINING GRADUATES)
26D10P	0	0	-1	-1	0	0
26D30P	1	0	1	0	1	1
35N10P	13	16	10	14	29	23
35N20P	8	8	-9	-2	3	2
35L10P	9	7	7	6	13	10
35L20P	3	3	-7	-3	0	0
35M10P	5	5	2	3	8	6
35M20P	2	2	-2	-1	1	1
35P30P	5	5	-8	-11	0	0
35P40P	1	1	-4	-5	0	0
35R10P	3	3	3	3	6	5
35R20P	1	1	-1	0	1	1

CMF 29

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DUTY POSITION	AUTHORIZED PERSONNEL FY84	AUTHORIZED PERSONNEL FY85	SHORTAGE START OF FY84	NET REQUIREMENTS FOR FY85	TRAINING ENTRANTS IN FY84	RECRUITMENT (TRAINING GRADUATES)
26B10P	2	3	-3	0	2	2
26B20P	1	0	0	-1	0	0

26C10P	2	2	-1	0	2	2
26C20P	1	1	1	0	1	1
26C30P	0	0	-6	-4	0	0
26L10P	3	3	-3	0	2	2
26L20P	1	1	-12	-7	0	0
26L30P	0	0	-2	-4	0	0
26L40P	0	1	-1	0	1	1
26V10P	0	0	-7	-4	0	0
26V20P	0	0	-10	-7	0	0
26V30P	0	0	-3	-4	0	0
26V40P	0	0	-1	-1	0	0
26Y10P	0	0	-2	-1	0	0
26Y20P	0	0	-6	-4	0	0
26Y30P	1	1	-3	-3	0	0
26Y40P	0	0	-5	-4	0	0
31E10P	19	26	-4	14	35	28
31E20P	41	45	6	22	58	46
31E30P	11	11	-7	-9	0	0
31E50P	0	0	-1	-1	0	0
31J10P	18	23	-12	7	24	19
31J20P	21	22	0	6	22	17
31J30P	3	3	-5	-7	0	0
31S10P	6	6	-10	-2	2	2
31S20P	11	13	-3	2	12	9
31S30P	5	6	-4	-3	1	1
31S40P	0	0	-3	-3	0	0
31T10P	5	5	0	2	6	5
31T20P	2	3	-3	-1	1	1
32F40P	0	0	-2	-2	0	0
32G10P	0	0	-1	-1	0	0
32G20P	0	0	-8	-4	0	0
32G30P	0	0	-1	-2	0	0
32H10P	11	18	7	16	33	26
32H20P	10	13	0	7	18	14
32H30P	14	18	7	11	27	21
32Z40P	18	21	-16	-10	2	2
32Z50P	1	1	-13	-14	0	0
35E10P	9	15	2	11	25	20
35E20P	4	4	-3	-1	2	2
35E30P	0	0	-3	-4	0	0
35H20P	4	4	-7	-2	1	1
35H30P	0	0	-15	-13	0	0
35H40P	0	0	-1	-3	0	0
36H10P	5	6	2	4	10	8
36H20P	8	8	2	4	12	9
36H30P	0	0	-3	-3	0	0
36H40P	0	0	-6	-5	0	0
36L10P	0	0	-1	-1	0	0
36L30P	1	1	1	1	2	2

CMF 31
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DUTY POSITION	AUTHORIZED PERSONNEL FY84	AUTHORIZED PERSONNEL FY85	SHORTAGE START OF FY84	NET REQUIREMENTS FOR FY85	TRAINING ENTRANTS IN FY84	RECRUITMENT (TRAINING GRADUATES)
05B10P	243	239	-78	71	246	194
05B20P	49	50	-59	-62	0	0
05C10P	250	268	-33	120	327	258
05C20P	133	139	3	22	119	94
05C30P	30	35	-29	-34	0	0
26Q10P	11	11	-2	4	12	9
26Q20P	6	6	-7	-3	1	1
26Q30P	1	1	-12	-11	0	0
26Q40P	0	0	-2	-3	0	0
26R20P	0	0	-1	-1	0	0
31M10P	68	68	-99	-19	21	17
31M20P	30	30	-26	-28	0	0
31M30P	4	4	-37	-37	0	0
31N10P	4	4	-7	-2	1	1
31N20P	0	0	-9	-7	0	0
31N30P	3	2	-3	-4	0	0
31V10P	111	121	6	68	166	131
31V20P	18	17	-58	-40	0	0
31V30P	92	91	-91	-74	0	0
31V40P	20	21	-62	-65	0	0
31V50P	8	8	-12	-14	0	0
31Z40P	39	41	-80	-52	0	0
31Z50P	16	17	-26	-27	0	0
32D20P	0	0	-1	-1	0	0
32D30P	0	0	-8	-6	0	0
32D40P	0	0	-1	-2	0	0
36C10P	66	72	-19	28	83	66
36C20P	16	17	-22	-18	0	0
36C30P	3	4	-30	-27	0	0
36C40P	0	0	-4	-8	0	0
36K10P	437	437	21	219	564	446
36K20P	55	57	-49	-69	0	0
36M10P	38	38	29	33	67	53
36M20P	18	18	7	11	27	21
36M30P	1	1	-2	-3	0	0
72E10P	167	187	46	124	279	220
72E20P	84	95	11	36	109	86
72E30P	17	22	-16	-17	0	0
72E40P	5	6	-14	-13	0	0
72G10P	0	0	-7	-4	0	0
72G20P	0	0	-11	-7	0	0
72G30P	0	0	-7	-7	0	0
72G40P	0	0	-1	-2	0	0
72H20P	0	0	-1	-1	0	0
72H30P	0	0	-2	-2	0	0

31V10V	0	0	-3	-3	0	0
31V20V	0	0	-3	-3	0	0
31V30V	6	6	-10	-8	0	0
31V40V	2	2	-1	-3	0	0
31V50V	0	0	-2	-2	0	0

CMF 33

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DUTY POSITION	AUTHORIZED PERSONNEL FY84	AUTHORIZED PERSONNEL FY85	SHORTAGE START OF FY84	NET REQUIREMENTS FOR FY85	TRAINING ENTRANTS IN FY84	RECRUITMENT (TRAINING GRADUATES)
33S10P	5	7	-3	3	9	7
33S20P	6	8	-5	1	7	6
33S30P	2	2	-9	-8	0	0
33S40P	1	1	-2	-3	0	0

CMF 51

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DUTY POSITION	AUTHORIZED PERSONNEL FY84	AUTHORIZED PERSONNEL FY85	SHORTAGE START OF FY84	NET REQUIREMENTS FOR FY85	TRAINING ENTRANTS IN FY84	RECRUITMENT (TRAINING GRADUATES)
00B20P	0	0	-2	-1	0	0
00B30P	0	0	-1	-1	0	0
00B40P	0	0	-1	-1	0	0
51B10P	3	3	-11	-4	0	0
51B20P	2	2	-7	-5	0	0
51C10P	4	4	0	2	6	5
51C20P	1	1	-4	-2	0	0
51G10P	0	0	-4	-2	0	0
51G20P	2	2	-1	0	2	2
51H30P	3	4	-16	-12	0	0
51H40P	3	3	-7	-7	0	0
51K10P	4	4	-8	-2	1	1
51K20P	1	1	0	-2	0	0
51M10P	0	0	-3	-2	0	0
51M20P	0	0	-1	-1	0	0
51M30P	0	0	-1	-1	0	0
51R10P	3	3	-12	-5	0	0
51R20P	1	1	-4	-4	0	0
51R30P	0	0	-1	-2	0	0
51T30P	0	0	-5	-7	0	0
51T40P	0	0	-2	-2	0	0
51Z50P	1	0	-4	-5	0	0
52E30P	0	0	-2	-1	0	0
52E40P	0	0	-4	-3	0	0
62E10P	116	117	20	67	162	128
62E20P	60	60	-7	8	50	40
62F10P	21	10	-2	-2	5	4
62F20P	8	6	-7	-6	0	0

62G10P	0	0	-1	-1	0	0
62H10P	4	4	3	3	7	6
62H20P	2	2	-1	0	2	2
62H30P	0	0	-2	-2	0	0
62J10P	19	19	-17	0	13	10
62J20P	5	5	-1	-4	0	0
62N30P	9	9	-6	-20	0	0
62N40P	10	10	-7	-5	1	1
81B10P	8	7	0	3	9	7
81B20P	1	1	-6	-4	0	0
82B10P	4	4	0	2	6	5
82B20P	6	6	0	2	7	6

CMF 54

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DUTY POSITION	AUTHORIZED PERSONNEL FY84	AUTHORIZED PERSONNEL FY85	SHORTAGE START OF FY84	NET REQUIREMENTS FOR FY85	TRAINING ENTRANTS IN FY84	RECRUITMENT (TRAINING GRADUATES)
54C20P	0	0	-3	-2	0	0
54C30P	0	0	-5	-4	0	0
54C40P	0	0	-1	-1	0	0
54E10P	57	0	-57	-57	0	0
54E20P	129	120	34	51	143	113
54E30P	45	41	-84	-68	0	0
54E40P	23	17	-22	-34	0	0
54E50P	4	4	-6	-8	0	0
54E20V	6	6	6	5	13	9
54E30V	2	2	-1	-2	0	0
54E40V	0	0	-1	-1	0	0

CMF 55

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DUTY POSITION	AUTHORIZED PERSONNEL FY84	AUTHORIZED PERSONNEL FY85	SHORTAGE START OF FY84	NET REQUIREMENTS FOR FY85	TRAINING ENTRANTS IN FY84	RECRUITMENT (TRAINING GRADUATES)
35F10P	0	0	-1	-1	0	0
35F20P	0	0	-1	-1	0	0
55B10P	56	69	-25	27	80	63
55B20P	4	6	-4	-12	0	0
55B30P	4	6	-5	-2	2	2
55B40P	2	1	-4	-5	0	0
55D10P	0	0	-6	-3	0	0
55D20P	2	0	-19	-12	0	0
55D30P	0	0	-12	-13	0	0
55D40P	0	0	-6	-6	0	0
55D50P	0	0	-3	-3	0	0
55G10P	0	0	-1	-1	0	0
55G20P	0	0	-4	-2	0	0
55G30P	0	0	-2	-2	0	0
55G40P	0	0	-2	-2	0	0

55R10P	8	5	-6	-2	1	1
55R20P	18	19	13	14	30	24
55R30P	0	0	-2	-2	0	0
55X40P	0	0	-3	-2	0	0
55Z50P	1	0	-1	-3	0	0

CMF 63
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DUTY POSITION	AUTHORIZED PERSONNEL FY84	AUTHORIZED PERSONNEL FY85	SHORTAGE START OF FY84	NET REQUIREMENTS FOR FY85	TRAINING ENTRANTS IN FY84	RECRUITMENT (TRAINING GRADUATES)
41C10P	4	4	-4	0	3	2
41C30P	0	0	-3	-2	0	0
41J10P	1	1	0	0	1	1
41J20P	1	1	1	1	2	2
41J30P	0	0	-1	-1	0	0
44B10P	15	16	7	12	26	21
44B20P	10	9	-10	-3	3	2
44E10P	6	7	2	5	12	9
44E20P	1	0	-6	-4	0	0
44E30P	2	2	-7	-10	0	0
44E40P	0	0	-5	-5	0	0
45B10P	8	8	3	5	13	10
45B20P	5	5	-3	0	4	3
45D10P	1	1	1	1	2	2
45D20P	0	0	-1	-1	0	0
45E10P	0	0	-2	-1	0	0
45G10P	0	1	-2	0	1	1
45G20P	1	0	-1	-1	0	0
45K10P	8	8	0	4	11	9
45K20P	3	3	0	0	2	2
45K30P	5	5	-3	-4	0	0
45L10P	7	7	4	5	11	9
45L20P	2	2	1	1	3	2
45N10P	8	8	-13	-3	2	2
45N20P	3	3	2	-1	3	2
45T10P	0	0	-1	-1	0	0
45Z40P	3	3	-9	-7	0	0
52C10P	22	21	-25	-4	9	7
52C20P	6	6	-7	-9	0	0
52C30P	2	2	-4	-5	0	0
52D10P	36	38	-19	9	37	29
52D20P	14	16	4	1	12	9
52D30P	1	1	-11	-10	0	0
62B10P	74	76	4	39	99	78
62B20P	23	24	-7	-4	11	9
62B30P	2	2	-8	-16	0	0
62B40P	6	5	-15	-14	0	0
63B10P	537	508	76	267	670	529
63B20P	186	204	-47	1	135	107

63B30P	75	72	-40	-58	0	0
63B40P	23	30	-64	-50	0	0
63B50P	10	7	-5	-13	0	0
63D10P	0	0	-2	-1	0	0
63D20P	0	0	-1	-1	0	0
63D30P	0	0	-4	-3	0	0
63D40P	0	0	-2	-2	0	0
63D50P	0	0	-2	-2	0	0
63E10P	0	0	-1	-1	0	0
63E40P	0	0	-1	-1	0	0
63G10P	8	8	-5	1	7	6
63G20P	1	1	-3	-3	0	0
63H10P	3	3	-36	-17	0	0
63H20P	1	1	-7	-10	0	0
63H30P	10	11	-22	-13	0	0
63H40P	9	10	-14	-11	0	0
63J10P	12	10	-4	2	10	8
63J20P	1	1	-3	-4	0	0
63N10P	28	16	4	3	15	12
63N20P	6	6	5	1	6	5
63N30P	5	6	-4	-6	0	0
63N40P	0	3	-12	-7	0	0
63N50P	0	0	-1	-2	0	0
63S10P	0	6	-7	2	7	6
63S20P	2	7	-14	-3	1	1
63T10P	0	0	-7	-4	0	0
63T20P	0	0	-4	-3	0	0
63T30P	0	0	-6	-5	0	0
63T40P	0	0	-6	-5	0	0
63T50P	0	0	-1	-1	0	0
63W10P	72	38	43	23	54	43
63W20P	20	12	-1	-4	3	2
63Y10P	1	1	-24	-12	0	0
63Y20P	1	1	-4	-6	0	0
63Z50P	12	8	-14	-16	0	0

CMF 64

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DUTY POSITION	AUTHORIZED PERSONNEL FY84	AUTHORIZED PERSONNEL FY85	SHORTAGE START OF FY84	NET REQUIREMENTS FOR FY85	TRAINING ENTRANTS IN FY84	RECRUITMENT (TRAINING GRADUATES)
57H20P	0	0	-3	-2	0	0
57H30P	0	0	-2	-2	0	0
57H40P	0	0	-1	-1	0	0
61B10P	0	0	-3	-2	0	0
61B20P	0	0	-2	-2	0	0
61B30P	0	0	-3	-3	0	0
61B40P	0	0	-3	-3	0	0
61Z50P	0	0	-1	-1	0	0
64C10P	301	346	-3	187	463	366
64C20P	7	9	-115	-108	0	0

64C30P	25	26	-27	-36	0	0
64C40P	4	3	-12	-16	0	0
64C50P	3	2	-7	-7	0	0
71N10P	3	5	-2	2	6	5
71N20P	1	1	-5	-3	0	0
71N30P	3	1	-8	-8	0	0
71N40P	1	3	-4	-2	0	0
71P10P	21	27	7	20	44	35
71P20P	1	1	-6	-5	0	0
71P30P	3	2	-6	-6	0	0
71P40P	6	6	0	0	4	3
71P50P	2	3	-5	-2	0	0
93E30P	0	0	-2	-1	0	0
93H10P	5	0	0	-3	0	0
93H20P	2	0	-14	-9	0	0
93H30P	2	0	-27	-24	0	0
93H40P	0	0	-5	-8	0	0
93J10P	6	0	-3	-5	0	0
93J20P	2	0	-17	-12	0	0
93J30P	4	0	-16	-18	0	0
93J40P	2	0	-2	-6	0	0
93J50P	1	0	1	-1	1	1

CMF 67

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DUTY POSITION	AUTHORIZED PERSONNEL FY84	AUTHORIZED PERSONNEL FY85	SHORTAGE START OF FY84	NET REQUIREMENTS FOR FY85	TRAINING ENTRANTS IN FY84	RECRUITMENT (TRAINING GRADUATES)
66J30P	0	0	-5	-3	0	0
66N30P	0	0	-5	-3	0	0
66V20P	0	0	-1	-1	0	0
66V30P	0	0	-3	-2	0	0
66Y20P	0	0	-1	-1	0	0
66Y30P	0	0	-4	-3	0	0
67G10P	2	3	-1	1	4	3
67G20P	5	8	-7	1	7	6
67G30P	0	0	-5	-6	0	0
67G40P	0	0	-1	-2	0	0
67H20P	0	0	-1	-1	0	0
67H30P	0	0	-2	-2	0	0
67N10P	15	27	-42	-3	14	11
67N20P	6	13	-60	-32	0	0
67N30P	1	2	-38	-39	0	0
67T10P	37	26	2	8	28	22
67T20P	16	9	-9	-10	0	0
67T30P	2	2	-19	-18	0	0
67U10P	0	0	-11	-6	0	0
67U20P	0	0	-12	-8	0	0
67U30P	0	0	-7	-7	0	0
67U40P	0	0	-1	-2	0	0

67V10P	38	34	13	21	49	39
67V20P	23	22	-3	4	20	16
67V30P	2	3	-24	-21	0	0
67W40P	2	2	1	1	3	2
67Y10P	55	53	8	28	71	56
67Y20P	37	35	-4	5	30	24
67Y30P	1	1	-23	-25	0	0
67Y40P	0	0	-16	-20	0	0
67Z40P	25	26	24	25	49	39
67Z50P	4	0	-24	-23	0	0
68B10P	23	22	12	16	35	28
68B20P	6	6	0	1	6	5
68B30P	1	2	-1	-1	1	1
68D10P	18	18	6	12	28	22
68D20P	2	2	-6	-4	0	0
68D30P	2	2	-2	-3	0	0
68F10P	13	10	10	8	17	13
68F20P	3	3	-5	-2	0	0
68F30P	2	2	0	-1	1	1
68G10P	27	26	1	12	32	25
68G20P	4	0	-13	-13	0	0
68G30P	2	2	-4	-6	0	0
68H10P	10	9	3	5	13	10
68H20P	1	1	-3	-2	0	0
68H30P	1	1	0	-1	0	0
68J10P	35	27	23	21	45	36
68J20P	9	8	-4	-1	4	3
68J30P	7	6	1	-1	3	2
68J40P	0	0	-2	-2	0	0
68K40P	9	9	-9	-6	0	0
68M10P	18	23	1	14	33	26
68M20P	5	6	-6	-3	1	1
68M30P	1	2	-2	-2	0	0

CMF 71
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DUTY POSITION	AUTHORIZED PERSONNEL FY84	AUTHORIZED PERSONNEL FY85	SHORTAGE START OF FY84	NET REQUIREMENTS FOR FY85	TRAINING ENTRANTS IN FY84	RECRUITMENT (TRAINING GRADUATES)
00J30P	0	0	-2	-1	0	0
00J40P	0	0	-11	-8	0	0
00J50P	0	0	-7	-6	0	0
00U20P	1	3	1	3	6	5
00U30P	7	7	-3	0	5	4
00U40P	8	10	-3	1	8	6
00U50P	2	2	-4	-3	0	0
03C10P	1	1	1	1	2	2
03C20P	0	0	-2	-1	0	0
03C30P	1	1	-7	-5	0	0
03C40P	1	1	1	0	1	1
71C10P	7	8	4	6	14	11

71C20P	16	16	11	13	27	21
71C30P	5	5	-4	-2	1	1
71D10P	4	8	-10	1	7	6
71D20P	27	41	4	26	60	47
71D30P	2	4	-20	-16	0	0
71D40P	8	7	-8	-8	0	0
71D50P	2	2	0	-1	1	1
71E20P	2	2	1	1	3	2
71E30P	1	1	1	1	2	2
71E40P	1	1	-5	-3	0	0
71L10P	295	401	15	260	592	468
71L20P	64	84	-103	-50	0	0
71L30P	21	21	-73	-80	0	0
71L40P	18	23	-43	-35	0	0
71L50P	12	9	-27	-24	0	0
71M10P	26	28	-2	13	35	28
71M20P	6	6	-11	-8	0	0
71M30P	5	6	-3	-3	1	1
71M40P	1	1	-1	-2	0	0
71M50P	1	1	-2	-1	0	0
73C10P	23	23	-12	5	22	17
73C20P	23	24	-7	2	19	15
73C30P	11	11	-13	-12	0	0
73C40P	3	3	-7	-8	0	0
73D10P	1	2	-4	-1	1	1
73D20P	3	2	-1	-1	1	1
73D30P	0	0	-3	-3	0	0
73D40P	1	1	0	0	1	1
73Z50P	3	3	-11	-8	0	0
75B10P	93	99	25	65	148	117
75B20P	68	70	-33	6	54	43
75B30P	24	23	-28	-35	0	0
75C10P	21	23	4	14	33	26
75C20P	10	7	-20	-12	0	0
75C30P	1	4	-9	-9	0	0
75D10P	50	58	-15	24	69	55
75D20P	18	22	-27	-13	0	0
75D30P	9	0	-16	-27	0	0
75E10P	26	29	4	17	41	32
75E20P	9	11	-8	-2	5	4
75E30P	2	2	-5	-7	0	0
75F10P	7	7	0	3	9	7
75F20P	6	6	-5	-1	3	2
75F30P	0	1	-9	-8	0	0
75Z30P	0	0	-1	-1	0	0
75Z40P	51	57	-26	-14	20	16
75Z50P	6	7	-9	-11	0	0
71L10V	1	1	1	-4	1	1
75B20V	8	8	2	5	14	10
75B30V	0	0	-5	-6	0	0
75Z40V	2	2	-4	-3	0	0
75Z50V	0	0	-1	-2	0	0

CMF 74

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DUTY POSITION	AUTHORIZED PERSONNEL FY84	AUTHORIZED PERSONNEL FY85	SHORTAGE START OF FY84	NET REQUIREMENTS FOR FY85	TRAINING ENTRANTS IN FY84	RECRUITMENT (TRAINING GRADUATES)
34B10P	1	1	1	1	2	2
34B20P	0	0	-1	-1	0	0
34C20P	0	0	-3	-2	0	0
34C30P	0	0	-7	-6	0	0
34C40P	0	0	-2	-3	0	0
34E20P	0	0	-1	-1	0	0
34E30P	0	0	-1	-1	0	0
34F10P	0	0	-1	-1	0	0
34F20P	0	0	-10	-5	0	0
34F30P	0	0	-2	-4	0	0
34F40P	0	0	-1	-1	0	0
34H20P	0	0	-2	-1	0	0
34H30P	0	0	-1	-1	0	0
34H40P	0	0	-2	-2	0	0
34K20P	1	1	1	1	2	2
34K30P	1	1	-1	0	1	1
34K40P	1	1	0	0	1	1
34Y10P	1	5	0	4	9	7
34Y20P	1	5	1	5	10	8
34Y30P	0	0	-1	-1	0	0
34Z50P	1	1	1	0	1	1
74D10P	12	5	-4	-3	0	0
74D20P	3	2	-22	-14	0	0
74D30P	3	2	-13	-15	0	0
74D40P	5	4	-6	-6	0	0
74F10P	0	1	-10	-4	0	0
74F20P	3	3	-8	-5	0	0
74F30P	4	3	-13	-11	0	0
74F40P	0	0	-10	-10	0	0
74Z50P	2	1	-3	-5	0	0

CMF 76

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DUTY POSITION	AUTHORIZED PERSONNEL FY84	AUTHORIZED PERSONNEL FY85	SHORTAGE START OF FY84	NET REQUIREMENTS FOR FY85	TRAINING ENTRANTS IN FY84	RECRUITMENT (TRAINING GRADUATES)
43E10P	647	707	251	500	1095	865
43E20P	236	228	-6	32	190	150
43E30P	142	142	-26	-27	59	47
43E40P	82	82	2	0	55	43
43E50P	16	15	-25	-22	0	0
43M10P	2	2	0	1	3	2
43M20P	0	0	-1	-1	0	0
57E10P	0	0	-6	-3	0	0

57E30P	1	0	1	0	1	1
57E40P	0	0	-1	-1	0	0
57F10P	0	2	-3	0	2	2
57F20P	4	4	3	3	7	6
57F30P	0	0	-1	-1	0	0
57F40P	0	0	-1	-1	0	0
57F50P	0	0	-1	-1	0	0
76C10P	148	195	-34	100	254	201
76C20P	13	18	-47	-45	0	0
76J10P	10	12	-3	5	14	11
76J20P	2	1	0	-2	0	0
76J30P	0	1	-9	-6	0	0
76J40P	2	2	0	-1	1	1
76J50P	0	0	-2	-2	0	0
76P10P	125	59	23	6	47	37
76P20P	27	11	-23	-33	0	0
76P30P	20	18	-14	-16	0	0
76P40P	9	2	-16	-21	0	0
76V10P	46	102	-32	61	144	114
76V20P	7	18	-23	-11	0	0
76V30P	2	11	-12	-5	1	1
76V40P	2	6	-9	-4	0	0
76X10P	19	21	13	18	37	29
76X20P	4	4	-2	0	3	2
76X30P	0	0	-5	-5	0	0
76X40P	2	1	0	-1	0	0
76Y10P	386	375	37	200	498	393
76Y20P	41	56	-84	-68	0	0
76Y30P	177	182	-45	-11	105	83
76Y40P	61	56	-44	-52	0	0
76Z50P	40	31	-22	-27	0	0
76Y10V	0	0	-2	-7	0	0
76Y20V	1	1	1	-2	1	1
76Y30V	8	8	-3	-2	4	3
76Y40V	2	2	-1	-2	0	0

CMF 79

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DUTY POSITION	AUTHORIZED PERSONNEL FY84	AUTHORIZED PERSONNEL FY85	SHORTAGE START OF FY84	NET REQUIREMENTS FOR FY85	TRAINING ENTRANTS IN FY84	RECRUITMENT (TRAINING GRADUATES)
00E30P	0	0	-6	-4	0	0
00E40P	0	0	-18	-14	0	0
00E50P	0	0	-6	-6	0	0
00R30P	13	25	-22	1	18	14
00R40P	5	3	-119	-92	0	0
00R50P	7	3	-49	-48	0	0
79D30P	1	1	-5	-3	0	0
79D40P	1	1	-4	-3	0	0
79D50P	1	1	-10	-7	0	0

CMF 81

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DUTY POSITION	AUTHORIZED PERSONNEL FY84	AUTHORIZED PERSONNEL FY85	SHORTAGE START OF FY84	NET REQUIREMENTS FOR FY85	TRAINING ENTRANTS IN FY84	RECRUITMENT (TRAINING GRADUATES)
41B10P	0	0	-1	-1	0	0
81C10P	1	1	-3	-1	0	0
81C20P	0	0	-2	-2	0	0
81C30P	0	0	-3	-3	0	0
81C40P	0	0	-1	-1	0	0
81Q30P	0	0	-1	-1	0	0
81Q40P	0	0	-1	-1	0	0
81Z50P	0	0	-1	-1	0	0
83E10P	0	4	0	4	8	6
83F10P	5	19	3	18	36	28
83F20P	1	3	-1	2	5	4
83F30P	0	3	-1	2	5	4

CMF 84

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DUTY POSITION	AUTHORIZED PERSONNEL FY84	AUTHORIZED PERSONNEL FY85	SHORTAGE START OF FY84	NET REQUIREMENTS FOR FY85	TRAINING ENTRANTS IN FY84	RECRUITMENT (TRAINING GRADUATES)
26T20P	0	0	-3	-2	0	0
26T30P	0	0	-1	-1	0	0
71Q10P	8	18	4	16	33	26
71Q20P	3	4	-5	-1	2	2
71Q30P	1	1	-4	-4	0	0
71Q40P	2	2	-2	-2	0	0
71R10P	1	6	1	6	12	9
71R20P	0	2	-1	1	3	2
71R30P	0	1	0	1	2	2
71R40P	0	1	0	1	2	2
81E10P	10	31	3	27	56	44
81E20P	1	7	-7	2	8	6
81E30P	0	3	-4	-2	0	0
84B10P	13	20	1	14	31	24
84B20P	1	1	-15	-10	0	0
84B30P	1	1	-6	-8	0	0
84B40P	0	0	-4	-4	0	0
84C20P	1	0	-1	-1	0	0
84F10P	0	6	0	6	12	9
84F20P	0	2	-5	-1	1	1
84F30P	0	0	-3	-3	0	0
84T40P	0	0	-1	-1	0	0
84Z50P	3	2	-4	-4	0	0

CMF 91

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DUTY POSITION	AUTHORIZED PERSONNEL FY84	AUTHORIZED PERSONNEL FY85	SHORTAGE START OF FY84	NET REQUIREMENTS FOR FY85	TRAINING ENTRANTS IN FY84	RECRUITMENT (TRAINING GRADUATES)
01H30P	0	0	-1	-1	0	0
35G10P	1	1	-4	-2	0	0
35G20P	0	0	-11	-7	0	0
35U20P	2	1	1	0	1	1
35U30P	1	2	-7	-6	0	0
35U40P	0	0	-1	-2	0	0
42C30P	0	0	-1	-1	0	0
42D10P	0	0	-2	-1	0	0
42D20P	0	0	-4	-2	0	0
42D30P	0	0	-7	-6	0	0
42E10P	0	0	-1	-1	0	0
42E20P	1	1	-5	-2	0	0
42E30P	0	0	-3	-3	0	0
42E40P	0	1	0	1	2	2
71G10P	16	17	4	11	26	21
71G20P	0	0	-10	-7	0	0
71G30P	0	0	-4	-5	0	0
71G40P	0	0	-2	-2	0	0
91B10P	319	371	-249	86	352	278
91B20P	184	163	-67	-64	26	21
91B30P	32	33	-138	-138	0	0
91B40P	29	29	-79	-74	0	0
91B50P	9	5	-8	-19	0	0
91C10P	9	19	7	18	36	28
91C20P	0	4	-10	-2	1	1
91C30P	27	27	-31	-16	0	0
91C40P	4	4	-46	-41	0	0
91C50P	0	0	-8	-11	0	0
91D10P	8	0	-8	-8	0	0
91D20P	5	5	-14	-8	0	0
91D30P	8	5	0	-5	0	0
91D40P	0	0	-4	-4	0	0
91D50P	0	0	-1	-1	0	0
91E10P	7	8	-3	3	10	8
91E20P	4	4	-25	-13	0	0
91E30P	0	0	-11	-14	0	0
91E40P	0	0	-2	-3	0	0
91F10P	0	0	-2	-1	0	0
91F20P	0	0	-3	-2	0	0
91F30P	0	0	-1	-1	0	0
91G10P	2	2	-2	0	2	2
91G20P	6	6	-1	2	7	6
91G30P	0	0	-11	-9	0	0
91G40P	0	0	-1	-2	0	0
91H10P	0	0	-2	-1	0	0
91H20P	4	4	1	2	5	4
91H30P	0	0	-3	-3	0	0

91J30P	0	0	-2	-1	0	0
91J40P	0	0	-1	-1	0	0
91L10P	0	0	-2	-1	0	0
91N10P	0	0	-1	-1	0	0
91N20P	0	0	-3	-2	0	0
91P10P	0	0	-2	-1	0	0
91P20P	5	5	-9	-3	0	0
91P30P	0	0	-7	-8	0	0
91P40P	0	0	-3	-3	0	0
91Q10P	0	0	-3	-2	0	0
91Q20P	7	8	-10	-2	3	2
91Q30P	0	0	-9	-10	0	0
91R10P	0	0	-1	-1	0	0
91R20P	0	0	-3	-2	0	0
91R40P	0	0	-2	-1	0	0
91S10P	3	3	-3	0	2	2
91S20P	2	3	0	1	4	3
91S30P	4	4	0	1	4	3
91S40P	1	2	-3	-1	1	1
91S50P	0	0	-1	-1	0	0
91T20P	0	0	-1	-1	0	0
91T30P	0	0	-2	-2	0	0
91U20P	0	0	-1	-1	0	0
91V20P	0	0	-1	-1	0	0
91V30P	0	0	-3	-2	0	0
91W40P	0	0	-1	-1	0	0
91Y10P	2	2	2	2	5	4
92B10P	3	4	-10	-3	0	0
92B20P	2	1	-11	-8	0	0
92B30P	2	2	-4	-5	0	0
91B10V	0	0	-4	-12	0	0
91B20V	20	20	17	14	36	24
91B30V	0	0	-7	-9	0	0
91B40V	0	0	-6	-6	0	0
91B50V	0	0	-2	-2	0	0

CMF 92

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DUTY POSITION	AUTHORIZED PERSONNEL FY84	AUTHORIZED PERSONNEL FY85	SHORTAGE START OF FY84	NET REQUIREMENTS FOR FY85	TRAINING ENTRANTS IN FY84	RECRUITMENT (TRAINING GRADUATES)
51N10P	18	18	11	14	30	24
51N20P	10	10	-4	1	8	6
51N30P	2	2	-4	-5	0	0
51N40P	0	1	-3	-2	0	0
76W10P	110	98	-4	38	112	88
76W20P	29	34	-1	-1	21	17
76W30P	4	4	-16	-16	0	0
76W40P	6	5	-3	-4	0	0
76W50P	0	0	-4	-4	0	0
92C10P	3	6	-1	4	10	8
92C20P	0	0	-1	-1	0	0
92C40P	0	0	-1	-1	0	0

CMF 94

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DUTY POSITION	AUTHORIZED PERSONNEL FY84	AUTHORIZED PERSONNEL FY85	SHORTAGE START OF FY84	NET REQUIREMENTS FOR FY85	TRAINING ENTRANTS IN FY84	RECRUITMENT (TRAINING GRADUATES)
94B10P	427	450	89	280	649	513
94B20P	113	115	15	7	84	66
94B30P	105	106	-20	-1	68	54
94B40P	86	100	-33	-4	61	48
94B50P	12	13	-21	-22	0	0
94F10P	0	0	-2	-1	0	0
94F20P	0	0	-2	-1	0	0
94F30P	0	0	-2	-2	0	0
94F40P	0	0	-1	-1	0	0
94B10V	0	0	-2	-7	0	0
94B20V	2	2	2	-1	3	2
94B30V	2	2	2	0	3	2
94B40V	2	2	1	1	3	2
94B50V	0	0	-1	-1	0	0

CMF 95

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DUTY POSITION	AUTHORIZED PERSONNEL FY84	AUTHORIZED PERSONNEL FY85	SHORTAGE START OF FY84	NET REQUIREMENTS FOR FY85	TRAINING ENTRANTS IN FY84	RECRUITMENT (TRAINING GRADUATES)
95B10P	218	103	-116	-72	0	0
95B20P	29	16	-100	-110	0	0
95B30P	25	14	-107	-106	0	0
95B40P	10	5	-49	-57	0	0
95B50P	2	0	-19	-21	0	0
95C10P	0	0	-3	-2	0	0
95C20P	0	0	-6	-4	0	0
95C30P	0	0	-6	-5	0	0
95C40P	0	0	-2	-2	0	0
95D20P	0	0	-1	-1	0	0
95D30P	0	0	-3	-2	0	0
95D40P	0	0	-6	-5	0	0
95D50P	0	0	-2	-2	0	0

CMF 96

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DUTY POSITION	AUTHORIZED PERSONNEL FY84	AUTHORIZED PERSONNEL FY85	SHORTAGE START OF FY84	NET REQUIREMENTS FOR FY85	TRAINING ENTRANTS IN FY84	RECRUITMENT (TRAINING GRADUATES)
17K10P	28	32	-34	0	21	17
17K20P	29	33	14	14	40	32
17K30P	11	12	-5	-2	6	5

17K40P	3	3	-10	-9	0	0
17K50P	1	1	-2	-2	0	0
17M20P	0	0	-1	-1	0	0
17M30P	0	0	-3	-2	0	0
96B10P	28	79	4	67	137	108
96B20P	34	74	-3	51	114	90
96B30P	24	53	-21	14	53	42
96B40P	14	55	-18	25	68	54
96B50P	12	24	-6	8	26	21
96C10P	2	15	-2	13	27	21
96C20P	2	54	-1	52	101	80
96C30P	3	32	-8	24	52	41
96C40P	1	15	-10	5	17	13
96C50P	0	0	-1	-2	0	0
96D10P	0	0	-3	-2	0	0
96D20P	3	4	-4	0	3	2
96D30P	0	0	-8	-7	0	0
96D40P	2	2	-7	-6	0	0
96D50P	2	2	-3	-2	0	0
96H10P	0	0	-1	-1	0	0
96H20P	0	0	-2	-1	0	0
96H30P	0	0	-1	-1	0	0
96H40P	0	0	-1	-1	0	0
96Z50P	4	6	-7	-1	3	2
97B10P	0	0	-11	-6	0	0
97B20P	1	1	-9	-6	0	0
97B30P	4	4	-23	-17	0	0
97B40P	7	8	-7	-6	0	0
97B50P	4	5	0	1	5	4
97C10P	19	22	19	22	43	34
97C20P	16	20	16	20	39	31
97C30P	5	6	3	5	11	9
97C40P	8	10	6	8	18	14
96B20V	0	0	-1	-1	0	0
96B30V	1	1	-1	-1	0	0
96B40V	0	0	-1	-1	0	0
96B50V	0	0	-1	-1	0	0

CMF 97

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DUTY POSITION	AUTHORIZED PERSONNEL FY84	AUTHORIZED PERSONNEL FY85	SHORTAGE START OF FY84	NET REQUIREMENTS FOR FY85	TRAINING ENTRANTS IN FY84	RECRUITMENT (TRAINING GRADUATES)
02B10P	4	3	4	3	6	5
02B20P	1	1	-1	0	1	1
02B30P	1	1	-2	-2	0	0
02C20P	1	0	0	-1	0	0
02C30P	1	1	-2	-1	0	0
02D10P	1	1	1	1	2	2
02D20P	1	1	1	1	2	2
02D30P	1	1	-1	0	1	1

02E10P	2	1	2	1	3	2
02E20P	1	1	1	1	2	2
02E30P	1	1	-1	0	1	1
02F10P	1	0	1	0	1	1
02F20P	1	1	1	1	2	2
02F30P	1	1	0	0	1	1
02G10P	0	0	-1	-1	0	0
02G20P	1	0	1	0	1	1
02G30P	1	1	0	0	1	1
02H30P	1	0	1	0	1	1
02J10P	4	2	0	0	2	2
02J20P	1	1	0	0	1	1
02J30P	1	1	0	0	1	1
02K20P	1	0	1	0	1	1
02L10P	2	1	2	1	3	2
02L20P	1	1	1	1	2	2
02L30P	1	1	-1	0	1	1
02M20P	1	0	-1	-1	0	0
02M30P	1	1	1	1	2	2
02N20P	1	1	1	1	2	2
02P40P	1	1	-3	-3	0	0
02Q40P	1	1	0	0	1	1
02R40P	1	1	1	1	2	2
02S30P	0	0	-2	-1	0	0
02S40P	0	0	-1	-1	0	0
02T30P	1	0	0	-1	0	0
02Z50P	1	1	-3	-2	0	0

CHF 98

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DUTY POSITION_	AUTHORIZED PERSONNEL FY84	AUTHORIZED PERSONNEL FY85	SHORTAGE START OF FY84	NET REQUIREMENTS FOR FY85	TRAINING ENTRANTS IN FY84	RECRUITMENT (TRAINING GRADUATES)
00D10P	0	3	0	3	6	5
00D40P	1	1	1	1	2	2
05D10P	3	4	-1	2	6	5
05D20P	3	4	-3	0	3	2
05D30P	1	2	-2	-1	1	1
05G10P	9	10	-12	-1	6	5
05G20P	6	8	-4	-1	4	3
05G30P	2	2	-6	-6	0	0
05G40P	1	1	1	0	1	1
05H10P	0	0	-12	-6	0	0
05H20P	10	12	-3	2	11	9
05H30P	1	1	-16	-14	0	0
05H40P	1	2	-13	-11	0	0
05K20P	0	0	-4	-2	0	0
05K30P	0	0	-7	-6	0	0
09W20P	0	0	-5	-3	0	0
09W30P	0	0	-3	-3	0	0

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98C10P      19      22       3       14       32       25
98C20P      16      20      -7        5       20       16
98C30P       5       6     -10       -9        0        0
98C40P       8      10      -1        1        8        6
98G10P      21      25      -5       11       31       24
98G20P      18      22     -19       -2       12        9
98G30P       5       6     -29      -26        0        0
98G40P       3       4      -6       -7        0        0
98J10P      12      13      -3        5       15       12
98J20P       5       6       0        1        6        5
98J30P       6       7       0        2        8        6
98J40P       5       8       1        4       11        9
98Z50P       3       3      -6       -7        0        0

DO YOU WANT TO SEE REQUIRED SCHOOL CAPACITY AND BUDGET TO CREATE INVENTORY
UP TO A MINIMUM PERCENTAGE COVERAGE OF AUTHORIZATIONS AT END OF FY85?
ENTER Y OR N
,Y
ENTER MINIMUM PERCENTAGE COVERAGE OF AUTHORIZATIONS REQUIRED
FOR EACH SQI; E.G.  .98 .9 .85 OF AUTHORIZATIONS TO BE COVERED
FOR P, V, AND S POSITIONS.
□:
      .1 1 1
REQUIRED SCHOOL CAPACITIES TO ACHIEVE THIS COVERAGE AT THE END OF FY85 ARE:
3346 13 1297
FOR P, V, S RESPECTIVELY


FOR FY85 A BUDGET OF 308976 DOLLARS
IS NEEDED TO COVER AUTHORIZATIONS UP TO THE ABOVE SPECIFIED LEVEL


DO YOU WANT TO SEE REQUIRED BUDGET AND SCHOOL CAPACITY FOR A
DIFFERENT PERCENTAGE COVERAGE? ENTER Y OR N
,N



DO YOU WANT TO CONTINUE WITH ORIGINAL BUDGET? ENTER Y OR N
,N
ENTER NEW AMOUNT OF TRAINING BUDGET FOR FY85:
□:
      .500000
DO YOU WANT TO CONTINUE WITH ORIGINAL SCHOOL CAPACITY? ENTER Y OR N
,Y


DO YOU WANT TO SEE THE RESULTS FOR FY85 (ENTER Y) OR QUIT(ENTER N)?
,Y
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**********************************************
*                                            *
* THE RESULTS  FOR FY85 ARE THE FOLLOWING;   *
*                                            *
**********************************************


BINDING CONSTRAINT IS BUDGET;
REMAINING BUDGET FOR THIS YEAR IS;11 DOLLARS,
REMAINING SCHOOL CAPACITIES FOR P, V, S ARE;12274  937    0.
THE MAX UNCOVERED PERCENTAGES OF PREDICTED SHORTAGE FOR FY86
FOR P,V,AND S RESPECTIVELY WILL BE LESS THAN;
-0.2532 -0.2485 0.02526
(NEGATIVE NUMBERS INDICATE SURPLUSES)


CMF 11
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DUTY POSITION	AUTHORIZED PERSONNEL FY85	AUTHORIZED PERSONNEL FY86	SHORTAGE START OF FY85	NET REQUIREMENTS FOR FY86	TRAINING ENTRANTS IN FY85	RECRUITMENT (TRAINING GRADUATES)
11B10P	4285	4285	-2212	1023	2669	2109
11B20P	679	679	-1136	-1373	0	0
11B30P	637	637	-415	-486	0	0
11B40P	246	246	-505	-457	0	0
11B50P	137	137	-275	-243	0	0
11C10P	573	573	-296	137	357	282
11C20P	224	224	-116	-101	0	0
11C30P	15	15	-114	-147	0	0
11C40P	47	47	-58	-48	0	0
11H10P	361	361	-186	75	211	167
11H20P	60	60	-174	-158	0	0
11H30P	64	64	-89	-93	0	0
11H40P	13	13	-53	-57	0	0
11M10P	0	0	-4	-2	0	0
11M20P	0	0	-2	-2	0	0
11M30P	0	0	-3	-3	0	0
11M40P	0	0	-3	-3	0	0
11B10V	59	59	-188	-192	0	0
11B20V	141	141	-73	-16	29	20
11B30V	234	234	-121	-82	0	0
11B40V	84	84	-103	-98	0	0
11B50V	34	34	-50	-59	0	0
11C10V	0	0	-29	-31	0	0
11C20V	6	6	-10	-11	0	0
11C30V	6	6	-12	-14	0	0
11C40V	0	0	-9	-9	0	0

CMF 12

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DUTY POSITION	AUTHORIZED PERSONNEL FY85	AUTHORIZED PERSONNEL FY86	SHORTAGE START OF FY85	NET REQUIREMENTS FOR FY86	TRAINING ENTRANTS IN FY85	RECRUITMENT (TRAINING GRADUATES)
12B10P	366	366	-189	87	228	180
12B20P	107	107	-56	-72	0	0
12B30P	61	61	-56	-55	0	0
12B40P	23	23	-62	-55	0	0
12C10P	0	0	-1	-1	0	0
12C30P	0	0	-1	-1	0	0
12C40P	0	0	-1	-1	0	0
12E10P	0	0	-1	-1	0	0
12E20P	0	0	-2	-1	0	0
12E30P	0	0	-3	-3	0	0
12E40P	0	0	-3	-3	0	0
12F10P	0	0	-1	-1	0	0
12F20P	0	0	-2	-1	0	0
12F30P	0	0	-3	-3	0	0
12Z40P	0	0	-1	-1	0	0
12Z50P	8	8	-32	-29	0	0
12B10V	0	0	-8	-14	0	0
12B20V	0	0	-4	-6	0	0
12B30V	0	0	-4	-6	0	0
12B40V	0	0	-3	-3	0	0

CMF 13

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DUTY POSITION	AUTHORIZED PERSONNEL FY85	AUTHORIZED PERSONNEL FY86	SHORTAGE START OF FY85	NET REQUIREMENTS FOR FY86	TRAINING ENTRANTS IN FY85	RECRUITMENT (TRAINING GRADUATES)
13B10P	529	55	-273	-364	0	0
13B20P	73	7	-132	-239	0	0
13B30P	63	9	-61	-122	0	0
13B40P	24	3	-56	-73	0	0
13C10P	8	6	-4	0	2	2
13C20P	6	4	-4	-3	0	0
13C30P	0	0	-3	-4	0	0
13C40P	8	5	-13	-11	0	0
13E10P	56	5	-29	-39	0	0
13E20P	23	2	-13	-32	0	0
13E30P	16	4	-8	-20	0	0
13E40P	3	0	-2	-7	0	0
13F10P	213	47	-111	-116	0	0
13F20P	121	24	-63	-127	0	0
13F30P	44	11	-34	-83	0	0
13F40P	17	2	-28	-42	0	0
13B10P	29	29	-16	5	16	13
13B20P	7	7	-4	-7	0	0

13R30P	2	2	-4	-5	0	0
13W50P	7	2	-10	-22	0	0
13Y50P	7	3	-40	-45	0	0
13Z50P	3	2	-4	-7	0	0
15D10P	0	0	-1	-1	0	0
15D20P	0	0	-1	-1	0	0
15D30P	0	0	-2	-2	0	0
15D40P	0	0	-2	-2	0	0
15E10P	0	0	-1	-1	0	0
15E20P	0	0	-1	-1	0	0
15E30P	0	0	-3	-2	0	0
15E40P	0	0	-1	-1	0	0
15J10P	0	0	-1	-1	0	0
15J20P	0	0	-1	-1	0	0
15J30P	0	0	-1	-1	0	0
17B10P	3	3	-2	0	1	1
17B20P	1	1	-1	-1	0	0
17B30P	1	1	-2	-2	0	0
17B40P	1	1	-5	-5	0	0
17C10P	35	35	-18	7	20	16
17C20P	18	18	-10	-6	0	0
17C30P	8	8	-4	-6	0	0
17C40P	6	6	-3	-2	0	0
82C10P	34	19	-18	-8	0	0
82C20P	17	11	-9	-12	0	0
82C30P	6	3	-14	-17	0	0
82C40P	5	2	-11	-12	0	0
93F10P	11	5	-5	-3	0	0
93F20P	4	2	-3	-4	0	0
93F30P	2	1	-3	-4	0	0
93F40P	2	1	-2	-3	0	0
13F10V	0	0	-7	-9	0	0
13F20V	18	18	-9	4	13	9
13F30V	8	8	-5	-10	0	0
13F40V	2	2	-5	-5	0	0

CMF 16

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DUTY POSITION	AUTHORIZED PERSONNEL FY85	AUTHORIZED PERSONNEL FY86	SHORTAGE START OF FY85	NET REQUIREMENTS FOR FY86	TRAINING ENTRANTS IN FY85	RECRUITMENT (TRAINING GRADUATES)
16B20P	0	0	-1	-1	0	0
16B30P	0	0	-3	-2	0	0
16B40P	0	0	-7	-6	0	0
16C10P	0	0	-1	-1	0	0
16C20P	0	0	-1	-1	0	0
16C30P	0	0	-2	-2	0	0
16D10P	0	0	-2	-1	0	0
16D20P	0	0	-3	-2	0	0
16D30P	0	0	-2	-2	0	0
16D40P	0	0	-1	-1	0	0

16E20P	0	0	-1	-1	0	0
16E30P	0	0	-1	-1	0	0
16H10P	9	9	-5	2	6	5
16H20P	3	3	-2	-2	0	0
16H30P	4	4	-3	-2	0	0
16H40P	4	4	-8	-8	0	0
16J10P	8	8	-5	1	4	3
16J20P	8	8	-5	-1	2	2
16J30P	8	8	-5	-4	0	0
16P10P	0	0	-1	-1	0	0
16P20P	0	0	-1	-1	0	0
16P30P	0	0	-7	-5	0	0
16R10P	208	208	-108	43	122	96
16R20P	72	72	-38	-40	0	0
16R30P	79	79	-41	-28	0	0
16R40P	19	19	-18	-26	0	0
16S10P	213	213	-111	44	125	99
16S20P	50	50	-34	-50	0	0
16S30P	26	26	-14	-20	0	0
16S40P	7	7	-4	-7	0	0
16Z50P	3	3	-21	-21	0	0

CMF 18

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DUTY POSITION	AUTHORIZED PERSONNEL FY85	AUTHORIZED PERSONNEL FY86	SHORTAGE START OF FY85	NET REQUIREMENTS FOR FY86	TRAINING ENTRANTS IN FY85	RECRUITMENT (TRAINING GRADUATES)
18B10S	6	6	-64	-21	0	0
18B20S	9	9	-130	-81	0	0
18B30S	103	103	-255	-216	0	0
18B40S	513	525	68	96	193	83
18C10S	0	0	-7	-3	0	0
18C20S	12	0	-95	-49	0	0
18C30S	29	29	-101	-112	0	0
18C40S	209	215	36	50	105	45
18D10S	8	8	-14	0	0	0
18D20S	7	7	-55	-29	0	0
18D30S	237	243	41	74	158	68
18D40S	218	224	38	39	88	38
18E10S	109	118	19	83	187	80
18E20S	272	279	47	143	316	136
18E30S	48	48	-92	-154	0	0
18E40S	282	287	49	73	153	66
18Z50S	570	576	-49	-20	0	0

CMF 19

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DUTY POSITION	AUTHORIZED PERSONNEL FY85	AUTHORIZED PERSONNEL FY86	SHORTAGE START OF FY85	NET REQUIREMENTS FOR FY86	TRAINING ENTRANTS IN FY85	RECRUITMENT (TRAINING GRADUATES)
19D10P	31	31	-16	6	18	14
19D20P	6	6	-33	-23	0	0

19D30P	9	9	-36	-31	0	0
19D40P	12	12	-19	-17	0	0
19E10P	135	135	-70	28	80	63
19E20P	51	51	-27	-25	0	0
19E30P	37	37	-25	-23	0	0
19E40P	1	1	-41	-38	0	0
19K30P	0	0	-5	-3	0	0
19K40P	0	0	-5	-4	0	0
19Z50P	12	12	-25	-22	0	0

CMF 23

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DUTY POSITION	AUTHORIZED PERSONNEL FY85	AUTHORIZED PERSONNEL FY86	SHORTAGE START OF FY85	NET REQUIREMENTS FOR FY86	TRAINING ENTRANTS IN FY85	RECRUITMENT (TRAINING GRADUATES)
22N30P	0	0	-2	-1	0	0
23W50P	0	0	-1	-1	0	0
24C40P	0	0	-1	-1	0	0
24E30P	0	0	-1	-1	0	0
24H20P	0	0	-2	-1	0	0
24H30P	0	0	-2	-2	0	0
24J20P	0	0	-1	-1	0	0
24J30P	0	0	-1	-1	0	0
24K20P	0	0	-1	-1	0	0
24K30P	0	0	-2	-2	0	0
24L30P	0	0	-1	-1	0	0
24P30P	0	0	-1	-1	0	0
24Q10P	0	0	-1	-1	0	0
24Q30P	0	0	-1	-1	0	0
24Q40P	0	0	-1	-1	0	0
24R40P	0	0	-2	-2	0	0
24R50P	0	0	-1	-1	0	0
24T30P	0	0	-2	-1	0	0
24T40P	0	0	-1	-1	0	0
24U20P	0	0	-1	-1	0	0
24U30P	0	0	-2	-2	0	0
24U40P	0	0	-1	-1	0	0
24V40P	0	0	-3	-3	0	0
25L20P	0	0	-1	-1	0	0
25L30P	0	0	-1	-1	0	0
25L40P	0	0	-2	-2	0	0
26H20P	0	0	-1	-1	0	0
26H30P	0	0	-2	-2	0	0

CMF 27

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DUTY POSITION	AUTHORIZED PERSONNEL FY85	AUTHORIZED PERSONNEL FY86	SHORTAGE START OF FY85	NET REQUIREMENTS FOR FY86	TRAINING ENTRANTS IN FY85	RECRUITMENT (TRAINING GRADUATES)
24M10P	12	12	-6	3	8	6
24M20P	8	8	-5	-2	1	1

24M30P	7	7	-4	-3	0	0
24M40P	6	6	-3	-2	0	0
27B10P	4	4	-2	1	3	2
27B20P	2	2	-2	-1	0	0
27B30P	0	0	-2	-2	0	0
27B40P	2	2	-4	-4	0	0
27E10P	25	21	-14	1	8	6
27E20P	10	9	-6	-6	0	0
27E30P	1	1	-9	-9	0	0
27F10P	17	15	-9	1	7	6
27F20P	6	6	-3	-3	0	0
27F30P	4	4	-2	-2	0	0
27G20P	0	0	-1	-1	0	0
27G30P	0	0	-1	-1	0	0
27G40P	1	1	-2	-2	0	0
27H10P	4	4	-3	0	2	2
27H20P	4	4	-3	-1	1	1
27H30P	1	1	-1	-2	0	0
27N10P	0	0	-3	-2	0	0
27N20P	0	0	-2	-2	0	0
27Z50P	3	3	-3	-3	0	0
46N30P	0	0	-1	-1	0	0

CMF 28

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DUTY POSITION	AUTHORIZED PERSONNEL FY85	AUTHORIZED PERSONNEL FY86	SHORTAGE START OF FY85	NET REQUIREMENTS FOR FY86	TRAINING ENTRANTS IN FY85	RECRUITMENT (TRAINING GRADUATES)
26D10P	0	0	-1	-1	0	0
26D30P	0	0	-1	-1	0	0
35K10P	16	16	-9	3	9	7
35K20P	8	8	-4	-3	0	0
35L10P	7	7	-4	1	4	3
35L20P	3	3	-3	-2	0	0
35M10P	5	5	-3	1	3	2
35M20P	2	2	-2	-1	0	0
35F30P	5	5	-11	-11	0	0
35F40P	1	1	-5	-6	0	0
35R10P	3	3	-2	0	1	1
35R20P	1	1	-1	-1	0	0

CMF 29

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DUTY POSITION	AUTHORIZED PERSONNEL FY85	AUTHORIZED PERSONNEL FY86	SHORTAGE START OF FY85	NET REQUIREMENTS FOR FY86	TRAINING ENTRANTS IN FY85	RECRUITMENT (TRAINING GRADUATES)
26B10P	3	3	-2	0	1	1
26B20P	0	0	-1	-1	0	0

26C10P	2	2	-2	0	1	1
26C20P	1	1	-1	-1	0	0
26C30P	0	0	-4	-3	0	0
26L10P	3	3	-2	0	1	1
26L20P	1	0	-7	-5	0	0
26L30P	0	0	-4	-5	0	0
26L40P	1	1	-1	-1	0	0
26V10P	0	0	-4	-2	0	0
26V20P	0	0	-7	-4	0	0
26V30P	0	0	-4	-4	0	0
26V40P	0	0	-1	-1	0	0
26Y10P	0	0	-1	-1	0	0
26Y20P	0	0	-4	-2	0	0
26Y30P	1	1	-3	-3	0	0
26Y40P	0	0	-4	-3	0	0
31E10P	26	27	-14	6	17	13
31E20P	45	44	-24	1	16	13
31E30P	11	11	-9	-18	0	0
31E50P	0	0	-1	-1	0	0
31J10P	23	27	-12	9	21	17
31J20P	22	23	-11	-1	7	6
31J30P	3	3	-7	-11	0	0
31S10P	6	8	-4	3	6	5
31S20P	13	13	-7	0	5	4
31S30P	6	6	-4	-5	0	0
31S40P	0	0	-3	-4	0	0
31T10P	5	4	-3	0	2	2
31T20P	3	4	-2	0	2	2
32F40P	0	0	-2	-2	0	0
32G10P	0	0	-1	-1	0	0
32G20P	0	0	-4	-2	0	0
32G30P	0	0	-2	-2	0	0
32H10P	18	18	-10	3	10	8
32H20P	13	13	-7	-2	2	2
32H30P	18	17	-10	-7	0	0
32Z40P	21	20	-12	-14	0	0
32Z50P	1	1	-14	-15	0	0
35E10P	15	15	-9	2	8	6
35E20P	4	4	-3	-4	0	0
35E30P	0	0	-4	-4	0	0
35H20P	4	4	-3	0	2	2
35H30P	0	0	-13	-11	0	0
35H40P	0	0	-3	-4	0	0
36H10P	6	9	-4	4	9	7
36H20P	8	8	-5	-1	2	2
36H30P	0	0	-3	-5	0	0
36H40P	0	0	-5	-4	0	0
36L10P	0	0	-1	-1	0	0
36L30P	1	0	-1	-1	0	0

CMF 31
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DUTY POSITION	AUTHORIZED PERSONNEL FY85	AUTHORIZED PERSONNEL FY86	SHORTAGE START OF FY85	NET REQUIREMENTS FOR FY86	TRAINING ENTRANTS IN FY85	RECRUITMENT (TRAINING GRADUATES)
05B10P	239	231	-123	42	127	100
05B20P	50	44	-62	-77	0	0
05C10P	268	262	-138	50	148	117
05C20P	139	127	-72	-54	0	0
05C30P	35	35	-34	-58	0	0
26Q10P	11	10	-5	2	6	5
26Q20P	6	6	-4	-2	0	0
26Q30P	1	1	-11	-10	0	0
26Q40P	0	0	-3	-4	0	0
26R20P	0	0	-1	-1	0	0
31M10P	68	96	-36	42	84	66
31M20P	30	45	-28	-4	10	8
31M30P	4	29	-37	-12	0	0
31N10P	4	7	-3	3	6	5
31N20P	0	3	-7	-2	0	0
31N30P	2	1	-4	-5	0	0
31V10P	121	99	-63	7	41	32
31V20P	17	12	-40	-49	0	0
31V30P	91	77	-74	-76	0	0
31V40P	21	21	-65	-65	0	0
31V50P	8	4	-14	-20	0	0
31Z40P	41	42	-52	-33	0	0
31Z50P	17	14	-27	-30	0	0
32D20P	0	0	-1	-1	0	0
32D30P	0	0	-6	-4	0	0
32D40P	0	0	-2	-2	0	0
36C10P	72	63	-38	5	27	21
36C20P	17	13	-18	-24	0	0
36C30P	4	7	-27	-22	0	0
36C40P	0	0	-8	-10	0	0
36K10P	437	363	-227	16	137	108
36K20P	57	42	-69	-138	0	0
36M10P	38	25	-20	-5	2	2
36M20P	12	11	-10	-14	0	0
36M30P	1	1	-3	-8	0	0
72E10P	187	191	-96	43	116	92
72E20P	95	81	-50	-44	0	0
72E30P	22	33	-17	-25	0	0
72E40P	6	6	-13	-13	0	0
72G10P	0	0	-4	-2	0	0
72G20P	0	0	-7	-4	0	0
72G30P	0	0	-7	-6	0	0
72G40P	0	0	-2	-2	0	0
72H20P	0	0	-1	-1	0	0
72H30P	0	0	-2	-2	0	0

31V10V	0	0	-3	-5	0	0
31V20V	0	0	-3	-3	0	0
31V30V	6	6	-8	-6	0	0
31V40V	2	2	-3	-4	0	0
31V50V	0	0	-2	-2	0	0

CMF 33

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DUTY POSITION	AUTHORIZED PERSONNEL FY85	AUTHORIZED PERSONNEL FY86	SHORTAGE START OF FY85	NET REQUIREMENTS FOR FY86	TRAINING ENTRANTS IN FY85	RECRUITMENT (TRAINING GRADUATES)
33S10P	7	7	-4	1	4	3
33S20P	8	8	-5	-1	2	2
33S30P	2	2	-8	-8	0	0
33S40P	1	1	-3	-3	0	0

CMF 51

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DUTY POSITION	AUTHORIZED PERSONNEL FY85	AUTHORIZED PERSONNEL FY86	SHORTAGE START OF FY85	NET REQUIREMENTS FOR FY86	TRAINING ENTRANTS IN FY85	RECRUITMENT (TRAINING GRADUATES)
00B20P	0	0	-1	-1	0	0
00B30P	0	0	-1	-1	0	0
00B40P	0	0	-1	-1	0	0
51B10P	3	3	-4	-1	0	0
51B20P	2	2	-5	-3	0	0
51C10P	4	4	-3	0	2	2
51C20P	1	1	-2	-2	0	0
51G10P	0	0	-2	-1	0	0
51G20P	2	2	-2	0	1	1
51H30P	4	4	-12	-10	0	0
51H40P	3	3	-7	-7	0	0
51K10P	4	4	-3	0	2	2
51K20P	1	1	-2	-2	0	0
51M10P	0	0	-2	-1	0	0
51M20P	0	0	-1	-1	0	0
51M30P	0	0	-1	-1	0	0
51F10P	3	3	-5	-1	0	0
51F20P	1	1	-4	-3	0	0
51F30P	0	0	-2	-2	0	0
51T30P	0	0	-7	-9	0	0
51T40P	0	0	-2	-2	0	0
51Z50P	0	0	-5	-5	0	0
52E30P	0	0	-1	-1	0	0
52E40P	0	0	-3	-2	0	0
62E10P	117	117	-61	24	68	54
62E20P	60	60	-32	-19	0	0
62F10P	10	10	-6	2	6	5
62F20P	6	6	-6	-3	0	0

62G10P	0	0	-1	-1	0	0
62H10P	4	4	-3	0	2	2
62H20P	2	2	-2	-1	0	0
62H30P	0	0	-2	-2	0	0
62J10P	19	19	-10	4	12	9
62J20P	5	5	-4	-5	0	0
62N30P	9	9	-20	-36	0	0
62N40P	10	10	-6	-6	0	0
81B10P	7	7	-4	1	4	3
81B20P	1	1	-4	-4	0	0
82B10P	4	4	-3	0	2	2
82B20P	6	6	-4	-1	1	1

CMF 54

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DUTY POSITION	AUTHORIZED PERSONNEL FY85	AUTHORIZED PERSONNEL FY86	SHORTAGE START OF FY85	NET REQUIREMENTS FOR FY86	TRAINING ENTRANTS IN FY85	RECRUITMENT (TRAINING GRADUATES)
54C20P	0	0	-2	-1	0	0
54C30P	0	0	-4	-3	0	0
54C40P	0	0	-1	-1	0	0
54E10P	0	0	-57	-29	0	0
54E20P	120	112	-62	8	46	36
54E30P	41	38	-68	-76	0	0
54E40P	17	17	-34	-36	0	0
54E50P	4	4	-8	-10	0	0
54E20V	6	6	-4	0	3	2
54E30V	2	2	-2	-5	0	0
54E40V	0	0	-1	-1	0	0

CMF 55

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DUTY POSITION	AUTHORIZED PERSONNEL FY85	AUTHORIZED PERSONNEL FY86	SHORTAGE START OF FY85	NET REQUIREMENTS FOR FY86	TRAINING ENTRANTS IN FY85	RECRUITMENT (TRAINING GRADUATES)
35F10P	0	0	-1	-1	0	0
35F20P	0	0	-1	-1	0	0
55B10P	69	69	-36	14	40	32
55B20P	6	6	-12	-22	0	0
55B30P	6	6	-4	-5	0	0
55B40P	1	1	-5	-5	0	0
55D10P	0	0	-3	-2	0	0
55D20P	0	0	-12	-7	0	0
55D30P	0	0	-13	-12	0	0
55D40P	0	0	-6	-6	0	0
55D50P	0	0	-3	-3	0	0
55G10P	0	0	-1	-1	0	0
55G20P	0	0	-2	-1	0	0
55G30P	0	0	-2	-2	0	0
55G40P	0	0	-2	-2	0	0

55R10P	5	5	-3	1	3	2
55R20P	19	19	-10	2	10	8
55R30P	0	0	-2	-8	0	0
55X40P	0	0	-2	-1	0	0
55Z50P	0	0	-3	-3	0	0

CMF 63

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DUTY POSITION	AUTHORIZED PERSONNEL FY85	AUTHORIZED PERSONNEL FY86	SHORTAGE START OF FY85	NET REQUIREMENTS FOR FY86	TRAINING ENTRANTS IN FY85	RECRUITMENT (TRAINING GRADUATES)
41C10P	4	4	-2	1	3	2
41C30P	0	0	-2	-1	0	0
41J10P	1	1	-1	0	1	1
41J20P	1	1	-1	0	1	1
41J30P	0	0	-1	-1	0	0
44B10P	16	14	-9	1	7	6
44B20P	9	9	-5	-3	0	0
44E10P	7	7	-4	1	4	3
44E20P	0	0	-4	-4	0	0
44E30P	2	2	-10	-10	0	0
44E40P	0	0	-5	-5	0	0
45B10P	8	8	-5	1	4	3
45B20P	5	5	-3	-1	1	1
45D10P	1	1	-1	0	1	1
45D20P	0	0	-1	-1	0	0
45E10P	0	0	-1	-1	0	0
45G10P	1	1	-1	0	1	1
45G20P	0	0	-1	-1	0	0
45K10P	8	8	-5	1	4	3
45K20P	3	3	-2	-2	0	0
45K30P	5	5	-4	-5	0	0
45L10P	7	7	-4	1	4	3
45L20P	2	2	-1	-1	0	0
45N10P	8	8	-5	1	4	3
45N20P	3	3	-3	-2	0	0
45T10P	0	0	-1	-1	0	0
45Z40P	3	3	-7	-6	0	0
52C10P	21	24	-11	7	17	13
52C20P	6	6	-9	-7	0	0
52C30P	2	2	-5	-6	0	0
52D10P	38	36	-20	6	20	16
52D20P	16	16	-8	-7	0	0
52D30P	1	1	-10	-12	0	0
62B10P	76	76	-39	16	45	36
62B20P	24	24	-13	-15	0	0
62B30P	2	2	-16	-22	0	0
62B40P	5	5	-14	-14	0	0
63B10P	508	459	-262	56	219	173
63B20P	204	185	-106	-111	0	0

63B30P	72	69	-58	-88	0	0
63B40P	30	24	-50	-53	0	0
63B50P	7	7	-13	-15	0	0
63D10P	0	0	-1	-1	0	0
63D20P	0	0	-1	-1	0	0
63D30P	0	0	-3	-3	0	0
63D40P	0	0	-2	-2	0	0
63D50P	0	0	-2	-2	0	0
63E10P	0	0	-1	-1	0	0
63E40P	0	0	-1	-1	0	0
63G10P	8	8	-5	1	4	3
63G20P	1	1	-3	-3	0	0
63H10P	3	3	-17	-7	0	0
63H20P	1	1	-10	-8	0	0
63H30P	11	11	-13	-8	0	0
63H40P	10	10	-11	-9	0	0
63J10P	10	10	-6	2	6	5
63J20P	1	1	-4	-4	0	0
63M10P	16	16	-9	3	9	7
63M20P	6	6	-4	-4	0	0
63M30P	6	6	-6	-11	0	0
63M40P	3	3	-7	-6	0	0
63M50P	0	0	-2	-2	0	0
63S10P	6	6	-4	1	4	3
63S20P	7	7	-4	-1	1	1
63T10P	0	0	-4	-2	0	0
63T20P	0	0	-3	-2	0	0
63T30P	0	0	-5	-4	0	0
63T40P	0	0	-5	-4	0	0
63T50P	0	0	-1	-1	0	0
63W10P	38	35	-20	5	18	14
63W20P	12	11	-6	-8	0	0
63Y10P	1	1	-12	-6	0	0
63Y20P	1	1	-6	-5	0	0
63Z50P	8	8	-16	-14	0	0

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DUTY POSITION	AUTHORIZED PERSONNEL FY85	AUTHORIZED PERSONNEL FY86	SHORTAGE START OF FY85	NET REQUIREMENTS FOR FY86	TRAINING ENTRANTS IN FY85	RECRUITMENT (TRAINING GRADUATES)
57H20P	0	0	-2	-1	0	0
57H30P	0	0	-2	-2	0	0
57H40P	0	0	-1	-1	0	0
61B10P	0	0	-2	-1	0	0
61B20P	0	0	-2	-1	0	0
61B30P	0	0	-3	-3	0	0
61B40P	0	0	-3	-3	0	0
61Z50P	0	0	-1	-1	0	0
64C10P	346	344	-179	69	198	156
64C20P	9	9	-108	-143	0	0

64C30P	26	26	-36	-42	0	0
64C40P	3	3	-16	-20	0	0
64Z50P	2	2	-7	-7	0	0
71N10P	5	5	-3	1	3	2
71N20P	1	1	-3	-2	0	0
71N30P	1	1	-8	-6	0	0
71N40P	3	3	-2	-2	0	0
71P10P	27	27	-15	5	16	13
71P20P	1	1	-5	-9	0	0
71P30P	2	2	-6	-5	0	0
71P40P	6	6	-3	-2	0	0
71P50P	3	3	-2	-1	0	0
93E30P	0	0	-1	-1	0	0
93H10P	0	0	-3	-2	0	0
93H20P	0	0	-9	-5	0	0
93H30P	0	0	-24	-19	0	0
93H40P	0	0	-8	-9	0	0
93J10P	0	0	-5	-3	0	0
93J20P	0	0	-12	-7	0	0
93J30P	0	0	-18	-15	0	0
93J40P	0	0	-6	-7	0	0
93J50P	0	0	-2	-3	0	0

CMF 67

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DUTY POSITION	AUTHORIZED PERSONNEL FY85	AUTHORIZED PERSONNEL FY86	SHORTAGE START OF FY85	NET REQUIREMENTS FOR FY86	TRAINING ENTRANTS IN FY85	RECRUITMENT (TRAINING GRADUATES)
66J30P	0	0	-3	-2	0	0
66N30P	0	0	-3	-2	0	0
66V20P	0	0	-1	-1	0	0
66V30P	0	0	-2	-2	0	0
66Y20P	0	0	-1	-1	0	0
66Y30P	0	0	-3	-2	0	0
67G10P	3	3	-2	0	1	1
67G20P	8	8	-5	0	3	2
67G30P	0	0	-6	-7	0	0
67G40P	0	0	-2	-3	0	0
67H20P	0	0	-1	-1	0	0
67H30P	0	0	-2	-2	0	0
67N10P	27	27	-14	6	17	13
67N20P	13	13	-32	-18	0	0
67N30P	2	2	-39	-36	0	0
67T10P	26	26	-14	5	15	12
67T20P	9	9	-10	-8	0	0
67T30P	2	2	-18	-16	0	0
67U10P	0	0	-6	-3	0	0
67U20P	0	0	-8	-5	0	0
67U30P	0	0	-7	-7	0	0
67U40P	0	0	-2	-2	0	0

67V10P	34	34	-18	7	20	16
67V20P	22	22	-12	-5	1	1
67V30P	3	3	-21	-21	0	0
67W40P	2	2	-1	0	1	1
67Y10P	53	53	-28	11	31	24
67Y20P	35	35	-19	-8	2	2
67Y30P	1	1	-25	-29	0	0
67Y40P	0	0	-20	-22	0	0
67Z40P	26	26	-14	-3	5	4
67Z50P	0	0	-23	-24	0	0
68B10P	22	22	-12	4	13	10
68B20P	6	6	-4	-5	0	0
68B30P	2	2	-2	-3	0	0
68D10P	18	18	-10	3	10	8
68D20P	2	2	-4	-6	0	0
68D30P	2	2	-3	-3	0	0
68F10P	10	10	-5	2	6	5
68F20P	3	3	-2	-2	0	0
68F30P	2	2	-2	-2	0	0
68G10P	26	26	-13	6	16	13
68G20P	0	0	-13	-14	0	0
68G30P	2	2	-6	-6	0	0
68H10P	9	9	-5	2	6	5
68H20P	1	1	-2	-3	0	0
68H30P	1	1	-1	-1	0	0
68J10P	27	27	-15	5	16	13
68J20P	8	8	-4	-6	0	0
68J30P	6	6	-3	-3	0	0
68J40P	0	0	-2	-3	0	0
68K40P	9	9	-6	-5	0	0
68M10P	23	23	-12	5	14	11
68M20P	6	6	-4	-5	0	0
68M30P	2	2	-2	-3	0	0

CMF 71

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DUTY POSITION	AUTHORIZED PERSONNEL FY85	AUTHORIZED PERSONNEL FY86	SHORTAGE START OF FY85	NET REQUIREMENTS FOR FY86	TRAINING ENTRANTS IN FY85	RECRUITMENT (TRAINING GRADUATES)
00J30P	0	0	-1	-1	0	0
00J40P	0	0	-8	-6	0	0
00J50P	0	0	-6	-5	0	0
00U20P	3	1	-2	-2	0	0
00U30P	7	6	-4	-3	0	0
00U40P	10	10	-5	-2	1	1
00U50P	2	2	-3	-3	0	0
03C10P	1	1	-1	0	1	1
03C20P	0	0	-1	-1	0	0
03C30P	1	1	-5	-3	0	0
03C40P	1	1	-1	-1	0	0
71C10P	8	8	-5	1	4	3

71C20P	16	16	-8	1	6	5
71C30P	5	5	-3	-6	0	0
71D10P	8	8	-5	1	4	3
71D20P	41	39	-21	4	18	14
71D30P	4	4	-16	-23	0	0
71D40P	7	7	-8	-7	0	0
71D50P	2	2	-2	-2	0	0
71E20P	2	2	-1	0	1	1
71E30P	1	1	-1	-1	0	0
71E40P	1	1	-3	-2	0	0
71L10P	401	392	-208	86	235	186
71L20P	84	83	-50	-90	0	0
71L30P	21	21	-80	-77	0	0
71L40P	23	23	-35	-33	0	0
71L50P	9	9	-24	-20	0	0
71M10P	28	26	-15	4	14	11
71M20P	6	5	-8	-10	0	0
71M30P	6	6	-4	-4	0	0
71M40P	1	1	-2	-3	0	0
71M50P	1	1	-1	-1	0	0
73C10P	23	0	-12	-18	0	0
73C20P	24	4	-13	-22	0	0
73C30P	11	0	-12	-24	0	0
73C40P	3	0	-8	-11	0	0
73D10P	2	0	-2	-2	0	0
73D20P	2	2	-2	-1	0	0
73D30P	0	0	-3	-3	0	0
73D40P	1	1	-1	-1	0	0
73Z50P	3	0	-8	-9	0	0
75B10P	99	90	-52	14	47	37
75B20P	70	65	-37	-16	1	1
75B30P	23	20	-35	-43	0	0
75C10P	23	23	-12	5	14	11
75C20P	7	7	-12	-9	0	0
75C30P	4	4	-9	-9	0	0
75D10P	58	58	-31	11	33	26
75D20P	22	22	-13	-12	0	0
75D30P	0	0	-27	-26	0	0
75E10P	29	29	-15	6	17	13
75E20P	11	11	-6	-6	0	0
75E30P	2	2	-7	-8	0	0
75F10P	7	7	-4	1	4	3
75F20P	6	6	-3	-1	1	1
75F30P	1	1	-8	-7	0	0
75Z30P	0	0	-1	-1	0	0
75Z40P	57	53	-30	-27	0	0
75Z50P	7	7	-11	-15	0	0
71L10V	1	1	-5	-13	0	0
75B20V	8	8	-5	2	6	4
75B30V	0	0	-6	-9	0	0
75Z40V	2	2	-3	-3	0	0
75Z50V	0	0	-2	-2	0	0

CMF 74

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DUTY POSITION	AUTHORIZED PERSONNEL FY85	AUTHORIZED PERSONNEL FY86	SHORTAGE START OF FY85	NET REQUIREMENTS FOR FY86	TRAINING ENTRANTS IN FY85	RECRUITMENT (TRAINING GRADUATES)
34B10P	1	1	-1	0	1	1
34B20P	0	0	-1	-1	0	0
34C20P	0	0	-2	-1	0	0
34C30P	0	0	-6	-5	0	0
34C40P	0	0	-3	-3	0	0
34E20P	0	0	-1	-1	0	0
34E30P	0	0	-1	-1	0	0
34F10P	0	0	-1	-1	0	0
34F20P	0	0	-5	-3	0	0
34F30P	0	0	-4	-4	0	0
34F40P	0	0	-1	-1	0	0
34H20P	0	0	-1	-1	0	0
34H30P	0	0	-1	-1	0	0
34H40P	0	0	-2	-2	0	0
34K20P	1	1	-1	0	1	1
34K30P	1	1	-1	-1	0	0
34K40P	1	1	-1	-1	0	0
34Y10P	5	5	-3	1	3	2
34Y20P	5	5	-3	-1	1	1
34Y30P	0	0	-1	-2	0	0
34Z50P	1	1	-1	-1	0	0
74D10P	5	5	-3	1	3	2
74D20P	2	2	-14	-8	0	0
74D30P	2	2	-15	-13	0	0
74D40P	4	4	-6	-6	0	0
74F10P	1	1	-4	-2	0	0
74F20P	3	3	-5	-2	0	0
74F30P	3	3	-11	-8	0	0
74F40P	0	0	-10	-9	0	0
74Z50P	1	1	-5	-5	0	0

CMF 76

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DUTY POSITION	AUTHORIZED PERSONNEL FY85	AUTHORIZED PERSONNEL FY86	SHORTAGE START OF FY85	NET REQUIREMENTS FOR FY86	TRAINING ENTRANTS IN FY85	RECRUITMENT (TRAINING GRADUATES)
43E10P	707	702	-365	141	404	319
43E20P	228	226	-118	-141	0	0
43E30P	142	142	-74	-83	0	0
43E40P	82	82	-43	-40	0	0
43E50P	15	15	-22	-24	0	0
43M10P	2	2	-1	0	1	1
43M20P	0	0	-1	-1	0	0
57E10P	0	0	-3	-2	0	0

57E30P	0	0	-1	-1	0	0
57E40P	0	0	-1	-1	0	0
57F10P	2	2	-2	0	1	1
57F20P	4	4	-3	0	2	2
57F30P	0	0	-1	-2	0	0
57F40P	0	0	-1	-1	0	0
57F50P	0	0	-1	-1	0	0
76C10P	195	181	-101	26	92	73
76C20P	18	20	-45	-64	0	0
76J10P	12	12	-6	3	8	6
76J20P	1	1	-2	-4	0	0
76J30P	1	1	-6	-5	0	0
76J40P	2	2	-2	-2	0	0
76J50P	0	0	-2	-2	0	0
76P10P	59	59	-31	12	34	27
76P20P	11	11	-33	-28	0	0
76P30P	18	18	-16	-15	0	0
76P40P	2	2	-21	-20	0	0
76V10P	102	97	-53	16	52	41
76V20P	18	18	-11	-24	0	0
76V30P	11	11	-6	-7	0	0
76V40P	6	6	-4	-4	0	0
76X10P	21	21	-11	4	12	9
76X20P	4	4	-2	-5	0	0
76X30P	0	0	-5	-5	0	0
76X40P	1	1	-1	-1	0	0
76Y10P	375	347	-193	62	190	150
76Y20P	56	52	-68	-109	0	0
76Y30P	182	167	-94	-63	0	0
76Y40P	56	53	-52	-65	0	0
76Z50P	31	30	-27	-25	0	0
76Y10V	0	0	-7	-14	0	0
76Y20V	1	1	-3	-5	0	0
76Y30V	8	8	-5	-5	0	0
76Y40V	2	2	-2	-3	0	0

CMF 79

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DUTY POSITION	AUTHORIZED PERSONNEL FY85	AUTHORIZED PERSONNEL FY86	SHORTAGE START OF FY85	NET REQUIREMENTS FOR FY86	TRAINING ENTRANTS IN FY85	RECRUITMENT (TRAINING GRADUATES)
00E30P	0	0	-4	-3	0	0
00E40P	0	0	-14	-11	0	0
00E50P	0	0	-6	-6	0	0
00R30P	25	23	-13	-3	4	3
00R40P	3	4	-92	-70	0	0
00R50P	3	2	-48	-43	0	0
79D30P	1	1	-3	-2	0	0
79D40P	1	1	-3	-2	0	0
79D50P	1	1	-7	-5	0	0

CMF 81

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DUTY POSITION	AUTHORIZED PERSONNEL FY85	AUTHORIZED PERSONNEL FY86	SHORTAGE START OF FY85	NET REQUIREMENTS FOR FY86	TRAINING ENTRANTS IN FY85	RECRUITMENT (TRAINING GRADUATES)
41B10P	0	0	-1	-1	0	0
81C10P	1	1	-1	0	1	1
81C20P	0	0	-2	-1	0	0
81C30P	0	0	-3	-3	0	0
81C40P	0	0	-1	-1	0	0
81Q30P	0	0	-1	-1	0	0
81Q40P	0	0	-1	-1	0	0
81Z50P	0	0	-1	-1	0	0
83E10P	4	4	-2	1	3	2
83F10P	19	19	-10	4	12	9
83F20P	3	3	-2	-5	0	0
83F30P	3	3	-2	-2	0	0

CMF 84

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DUTY POSITION	AUTHORIZED PERSONNEL FY85	AUTHORIZED PERSONNEL FY86	SHORTAGE START OF FY85	NET REQUIREMENTS FOR FY86	TRAINING ENTRANTS IN FY85	RECRUITMENT (TRAINING GRADUATES)
26T20P	0	0	-2	-1	0	0
26T30P	0	0	-1	-1	0	0
71Q10P	18	18	-10	3	10	8
71Q20P	4	3	-3	-6	0	0
71Q30P	1	1	-4	-4	0	0
71Q40P	2	2	-2	-2	0	0
71R10P	6	6	-3	1	4	3
71R20P	2	2	-1	-1	0	0
71R30P	1	1	-1	-1	0	0
71R40P	1	1	-1	-1	0	0
81E10P	31	30	-17	5	17	13
81E20P	7	7	-4	-7	0	0
81E30P	3	3	-2	-3	0	0
84B10P	20	19	-10	3	11	9
84B20P	1	1	-10	-10	0	0
84B30P	1	1	-8	-8	0	0
84B40P	0	0	-4	-5	0	0
84C20P	0	0	-1	-1	0	0
84F10P	6	6	-3	1	4	3
84F20P	2	2	-2	-2	0	0
84F30P	0	0	-3	-3	0	0
84T40P	0	0	-1	-1	0	0
84Z50P	2	2	-4	-3	0	0

CMF 91

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DUTY POSITION	AUTHORIZED PERSONNEL FY85	AUTHORIZED PERSONNEL FY86	SHORTAGE START OF FY85	NET REQUIREMENTS FOR FY86	TRAINING ENTRANTS IN FY85	RECRUITMENT (TRAINING GRADUATES)
01H30P	0	0	-1	-1	0	0
35G10P	1	1	-2	-1	0	0
35G20P	0	0	-7	-4	0	0
35U20P	1	1	-1	0	1	1
35U30P	2	2	-6	-6	0	0
35U40P	0	0	-2	-3	0	0
42C30P	0	0	-1	-1	0	0
42D10P	0	0	-1	-1	0	0
42D20P	0	0	-2	-1	0	0
42D30P	0	0	-6	-5	0	0
42E10P	0	0	-1	-1	0	0
42E20P	1	1	-2	-1	0	0
42E30P	0	0	-3	-3	0	0
42E40P	1	1	-1	-1	0	0
71G10P	17	17	-10	3	10	8
71G20P	0	0	-7	-8	0	0
71G30P	0	0	-5	-5	0	0
71G40P	0	0	-2	-2	0	0
91B10P	371	350	-192	67	197	156
91B20P	163	159	-85	-66	0	0
91B30P	33	29	-138	-142	0	0
91B40P	29	29	-74	-70	0	0
91B50P	5	5	-19	-23	0	0
91C10P	19	19	-10	4	12	9
91C20P	4	4	-3	-5	0	0
91C30P	27	23	-16	-8	0	0
91C40P	4	4	-41	-35	0	0
91C50P	0	0	-11	-12	0	0
91D10P	0	0	-8	-4	0	0
91D20P	5	5	-8	-3	0	0
91D30P	5	5	-5	-5	0	0
91D40P	0	0	-4	-4	0	0
91D50P	0	0	-1	-1	0	0
91E10P	8	8	-5	1	4	3
91E20P	4	4	-13	-7	0	0
91E30P	0	0	-14	-13	0	0
91E40P	0	0	-3	-4	0	0
91F10P	0	0	-1	-1	0	0
91F20P	0	0	-2	-1	0	0
91F30P	0	0	-1	-1	0	0
91G10P	2	2	-2	0	1	1
91G20P	6	6	-4	0	2	2
91G30P	0	0	-9	-8	0	0
91G40P	0	0	-2	-3	0	0
91H10P	0	0	-1	-1	0	0
91H20P	4	4	-2	1	3	2
91H30P	0	0	-3	-3	0	0

91J30P	0	0	-1	-1	0	0
91J40P	0	0	-1	-1	0	0
91L10P	0	0	-1	-1	0	0
91N10P	0	0	-1	-1	0	0
91N20P	0	0	-2	-1	0	0
91P10P	0	0	-1	-1	0	0
91P20P	5	5	-3	1	3	2
91P30P	0	0	-8	-7	0	0
91P40P	0	0	-3	-3	0	0
91Q10P	0	0	-2	-1	0	0
91Q20P	8	8	-4	1	4	3
91Q30P	0	0	-10	-10	0	0
91R10P	0	0	-1	-1	0	0
91R20P	0	0	-2	-1	0	0
91R40P	0	0	-1	-1	0	0
91S10P	3	3	-2	0	1	1
91S20P	3	3	-2	-1	0	0
91S30P	4	4	-2	-1	1	1
91S40P	2	2	-2	-2	0	0
91S50P	0	0	-1	-1	0	0
91T20P	0	0	-1	-1	0	0
91T30P	0	0	-2	-2	0	0
91U20P	0	0	-1	-1	0	0
91V20P	0	0	-1	-1	0	0
91V30P	0	0	-2	-2	0	0
91W40P	0	0	-1	-1	0	0
91Y10P	2	2	-2	0	1	1
92B10P	4	4	-3	0	2	2
92B20P	1	1	-8	-5	0	0
92B30P	2	2	-5	-5	0	0
91B10V	0	0	-12	-16	0	0
91B20V	20	20	-10	3	12	8
91B30V	0	0	-9	-17	0	0
91B40V	0	0	-6	-6	0	0
91B50V	0	0	-2	-2	0	0

CMF 92

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DUTY POSITION	AUTHORIZED PERSONNEL FY85	AUTHORIZED PERSONNEL FY86	SHORTAGE START OF FY85	NET REQUIREMENTS FOR FY86	TRAINING ENTRANTS IN FY85	RECRUITMENT (TRAINING GRADUATES)
51N10P	18	18	-10	3	10	8
51N20P	10	10	-5	-3	0	0
51N30P	2	2	-5	-6	0	0
51N40P	1	1	-2	-2	0	0
76W10P	98	97	-50	20	56	44
76W20P	34	34	-18	-19	0	0
76W30P	4	4	-16	-21	0	0
76W40P	5	5	-4	-4	0	0
76W50P	0	0	-4	-4	0	0
92C10P	6	6	-4	1	4	3
92C20P	0	0	-1	-2	0	0
92C40P	0	0	-1	-1	0	0

CMF 94

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DUTY POSITION	AUTHORIZED PERSONNEL FY85	AUTHORIZED PERSONNEL FY86	SHORTAGE START OF FY85	NET REQUIREMENTS FOR FY86	TRAINING ENTRANTS IN FY85	RECRUITMENT (TRAINING GRADUATES)
94B10P	450	414	-233	71	223	176
94B20P	115	101	-59	-106	0	0
94B30P	106	92	-55	-56	0	0
94B40P	100	95	-52	-38	0	0
94B50P	13	12	-22	-28	0	0
94F10P	0	0	-1	-1	0	0
94F20P	0	0	-1	-1	0	0
94F30P	0	0	-2	-2	0	0
94F40P	0	0	-1	-1	0	0
94B10V	0	0	-7	-16	0	0
94B20V	2	2	-3	-5	0	0
94B30V	2	2	-2	-5	0	0
94B40V	2	2	-1	-1	0	0
94B50V	0	0	-1	-1	0	0

CMF 95

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DUTY POSITION	AUTHORIZED PERSONNEL FY85	AUTHORIZED PERSONNEL FY86	SHORTAGE START OF FY85	NET REQUIREMENTS FOR FY86	TRAINING ENTRANTS IN FY85	RECRUITMENT (TRAINING GRADUATES)
95B10P	103	0	-72	-92	0	0
95B20P	16	1	-110	-96	0	0
95B30P	14	2	-106	-109	0	0
95B40P	5	1	-57	-61	0	0
95B50P	0	0	-21	-21	0	0
95C10P	0	0	-2	-1	0	0
95C20P	0	0	-4	-2	0	0
95C30P	0	0	-5	-4	0	0
95C40P	0	0	-2	-2	0	0
95D20P	0	0	-1	-1	0	0
95D30P	0	0	-2	-2	0	0
95D40P	0	0	-5	-4	0	0
95D50P	0	0	-2	-2	0	0

CMF 96

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DUTY POSITION	AUTHORIZED PERSONNEL FY85	AUTHORIZED PERSONNEL FY86	SHORTAGE START OF FY85	NET REQUIREMENTS FOR FY86	TRAINING ENTRANTS IN FY85	RECRUITMENT (TRAINING GRADUATES)
17K10P	32	32	-17	6	18	14
17K20P	33	33	-18	-2	9	7
17K30P	12	12	-7	-12	0	0

17K40P	3	3	-9	-9	0	0
17K50P	1	1	-2	-2	0	0
17M20P	0	0	-1	-1	0	0
17M30P	0	0	-2	-2	0	0
96B10P	79	79	-41	19	50	40
96B20P	74	69	-39	-10	10	8
96B30P	53	52	-28	-28	0	0
96B40P	55	55	-29	-17	0	0
96B50P	24	24	-13	-10	0	0
96C10P	15	15	-8	3	9	7
96C20P	54	54	-28	7	27	21
96C30P	32	32	-17	-20	0	0
96C40P	15	15	-8	-9	0	0
96C50P	0	0	-2	-4	0	0
96D10P	0	0	-2	-1	0	0
96D20P	4	4	-2	0	2	2
96D30P	0	0	-7	-6	0	0
96D40P	2	2	-6	-5	0	0
96D50P	2	2	-2	-2	0	0
96H10P	0	0	-1	-1	0	0
96H20P	0	0	-1	-1	0	0
96H30P	0	0	-1	-1	0	0
96H40P	0	0	-1	-1	0	0
96Z50P	6	6	-3	0	2	2
97B10P	0	0	-6	-3	0	0
97B20P	1	1	-6	-4	0	0
97B30P	4	4	-17	-12	0	0
97B40P	8	8	-6	-5	0	0
97B50P	5	5	-3	-4	0	0
97C10P	22	22	-12	4	13	10
97C20P	20	20	-11	-2	4	3
97C30P	6	6	-4	-8	0	0
97C40P	10	10	-6	-3	0	0
96B20V	0	0	-1	-2	0	0
96B30V	1	1	-1	-2	0	0
96B40V	0	0	-1	-1	0	0
96B50V	0	0	-1	-1	0	0

CMF 97

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DUTY POSITION	AUTHORIZED PERSONNEL FY85	AUTHORIZED PERSONNEL FY86	SHORTAGE START OF FY85	NET REQUIREMENTS FOR FY86	TRAINING ENTRANTS IN FY85	RECRUITMENT (TRAINING GRADUATES)
02B10P	3	3	-2	0	1	1
02B20P	1	1	-1	-1	0	0
02B30P	1	1	-2	-2	0	0
02C20P	0	0	-1	-1	0	0
02C30P	1	1	-1	-1	0	0
02D10P	1	1	-1	0	1	1
02D20P	1	1	-1	0	1	1
02D30P	1	1	-1	-1	0	0

02E10P	1	1	-1	0	1	1
02E20P	1	1	-1	0	1	1
02E30P	1	1	-1	-1	0	0
02F10P	0	0	-1	-1	0	0
02F20P	1	1	-1	0	1	1
02F30P	1	1	-1	-1	0	0
02G10P	0	0	-1	-1	0	0
02G20P	0	0	-1	-1	0	0
02G30P	1	1	-1	-1	0	0
02H30P	0	0	-1	-1	0	0
02J10P	2	2	-2	0	1	1
02J20P	1	1	-1	-1	0	0
02J30P	1	1	-1	-1	0	0
02K20P	0	0	-1	-1	0	0
02L10P	1	1	-1	0	1	1
02L20P	1	1	-1	0	1	1
02L30P	1	1	-1	-1	0	0
02M20P	0	0	-1	-1	0	0
02M30P	1	1	-1	-1	0	0
02N20P	1	1	-1	0	1	1
02P40P	1	1	-3	-3	0	0
02Q40P	1	1	-1	-1	0	0
02R40P	1	1	-1	-1	0	0
02S30P	0	0	-1	-1	0	0
02S40P	0	0	-1	-1	0	0
02T30P	0	0	-1	-1	0	0
02Z50P	1	1	-2	-2	0	0

CHF 98

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DUTY POSITION	AUTHORIZED PERSONNEL FY85	AUTHORIZED PERSONNEL FY86	SHORTAGE START OF FY85	NET REQUIREMENTS FOR FY86	TRAINING ENTRANTS IN FY85	RECRUITMENT (TRAINING GRADUATES)
00D10P	3	3	-2	0	1	1
00D40P	1	1	-1	0	1	1
05D10P	4	4	-3	0	2	2
05D20P	4	4	-2	0	2	2
05D30P	2	2	-2	-2	0	0
05G10P	10	10	-6	2	6	5
05G20P	8	8	-4	-1	2	2
05G30P	2	2	-6	-6	0	0
05G40P	1	1	-1	-2	0	0
05H10P	0	0	-6	-3	0	0
05H20P	12	12	-7	0	4	3
05H30P	1	1	-14	-14	0	0
05H40P	2	2	-11	-10	0	0
05K20P	0	0	-2	-1	0	0
05K30P	0	0	-6	-5	0	0
09W20P	0	0	-3	-2	0	0
09W30P	0	0	-3	-3	0	0

98C10P	22	22	-11	5	14	11
98C20P	20	20	-11	-2	4	3
98C30P	6	6	-9	-11	0	0
98C40P	10	10	-5	-3	0	0
98G10P	25	25	-13	5	15	12
98G20P	22	22	-11	-2	5	4
98G30P	6	6	-26	-23	0	0
98G40P	4	4	-7	-9	0	0
98J10P	13	13	-7	3	8	6
98J20P	6	6	-4	-3	0	0
98J30P	7	7	-4	-3	0	0
98J40P	8	8	-5	-3	0	0
98Z50P	3	3	-7	-10	0	0

DO YOU WANT ANOTHER RUN FOR THE SAME YEAR(S) USING NEW VALUES FOR
COMPLETION RATES, COSTS OF TRAINING, BUDGET, AND SCHOOL CAPACITY?
ENTER Y OR N
,N
*****END*****

APPENDIX E

LISTING OF THE PROGRAMS

1. Listing of the Functions "DATAINPUT", "DAT1", "DAT2".

```
      ∇DATAINPUT[□]∇
     ∇ DATAINPUT;T;AL;A;C;CA;CC;TYR
[1]   'THIS FUNCTION IS USED TO CREATE VECTORS OF DUTY POSITIONS,'
[2]   'AUTHORIZATIONS, AND INVENTORIES.'
[3]   ' '
[4]   ' '
[5]   AL← 11 12 13 16 18 19 23 27 28 29 31 33 51 54 55 63 64 67 71 74 76 79
        81 84 91 92 94 95 96 97 98
[6]   'ENTER THE FY (2 DIGITS) FOR WHICH INVENTORIES ARE AVAILABLE:'
[7]   T←□
[8]  CORN:'ENTER CMF NUMBER FOR WHICH YOU WANT TO ENTER DATA; ONE OF'
[9]   'THE FOLLOWING:'
[10]  AL
[11]  C←□
[12]  'ENTER ''PO'' TO ENTER DUTY POSITIONS'
[13]  '      ''A1'' TO ENTER AUTHORIZATIONS OF BEGINNING FY',▼T
[14]  '      ''A2'' TO ENTER AUTHORIZATIONS OF BEGINNING FY',▼T+1
[15]  '      ''A3'' TO ENTER AUTHORIZATIONS OF BEGINNING FY',▼T+2
[16]  '      ''IN'' TO ENTER INVENTORIES OF BEGINNING FY',▼T
[17]  ' :'
[18]  CA←□
[19]  CC←CA,▼C
[20]  →MON×⍳(2=+/(CA='PO'))
[21]  'THE SEQUENCE OF DATA NUMBERS MUST BE SEPARATED BY  A BLANK  SPACE'
[22]  'OR COMMA. IF DATA DO NOT FIT IN ONE LINE TO CONTINUE IN NEXT LINE'
[23]  'TYPE ,□ BEFORE PRESSING ENTER.'
[24]  ' '
[25]  ' '
[26]  →COM1
[27] MON:'THE SEQUENCE OF NAMES OF DUTY POSITIONS SEPARATED BY A BLANK SPACE'
[28]  'MUST BE ENTERED IN QUOTES. FOR EXAMPLE,''11B10P 11B20P ... 11C40V'';'
[29]  'IF NAMES DO NOT FIT IN ONE LINE TO CONTINUE IN NEXT LINE TYPE(AFTER'
[30]  'THE LAST NAME) A SPACE FOLLOWED BY '',□  BEFORE PRESSING ENTER.'
[31]  ' '
[32]  ' '
[33] COM1:→TRE×⍳(C>70)
[34]  CC DAT1(T,C)
[35]  'DO YOU WANT TO ENTER MORE DATA? ENTER Y OR N'
[36]  TYR←□
[37]  →CORN×⍳(TYR='Y')
[38]  →0
[39] TRE:CC DAT2(T,C)
[40]  'DO YOU WANT TO ENTER MORE DATA? ENTER Y OR N'
[41]  TYR←□
[42]  →CORN×⍳(TYR='Y')
[43]  →0
      ∇
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```
∇DAT1[□]∇
      ∇ R←CC DAT1 C;AL;A;C;CA;CC
[1]   ⍝ THIS FUNCTION IS USED FOR THE CREATION OF REQUIRED VECTORS.
[2]    T←C[1]
[3]    C←C[2]
[4]    AL←'PO11A111A211A311IN11PO12A112A212A312IN12PO13A113A213A313I
[5]    →(4=+/(((⍴,AL)⍳4),4)⍴((⍴,AL)⍴CC)=AL)/L,B,K,D,E,F,G,H,I,J,M,N,
[6]    'THIS CMF IS NOT INCLUDED IN THE NUMBERS I SPECIFIED.'
[7]    →0
[8]   L:'ENTER NAMES OF DUTY POSITIONS (INSIDE QUOTES) FOR CMF ',⍕C
[9]    PO11←(((⌈(⍴,A)÷7),7)⍴,(((⌈(⍴,A)÷7)×7)↑A←□
[10]   →0
[11]  B:'ENTER AUTHORIZATIONS FOR FY',(⍕T),' AND CMF ',⍕C
[12]   A111←((⍴,A),1)⍴,A←□
[13]   →0
[14]  K:'ENTER AUTHORIZATIONS FOR FY',(⍕T+1),' AND CMF ',⍕C
[15]   A112←((⍴,A),1)⍴,A←□
[16]   →0
[17]  D:'ENTER AUTHORIZATIONS FOR FY',(⍕T+2),' AND CMF ',⍕C
[18]   A113←((⍴,A),1)⍴,A←□
[19]   →0
[20]  E:'ENTER INVENTORIES FOR FY',(⍕T),' AND CMF ',⍕C
[21]   INV11←((⍴,A),1)⍴,A←□
[22]   →0
[23]  F:'ENTER NAMES OF DUTY POSITIONS (INSIDE QUOTES) FOR CMF ',⍕C
[24]   PO12←(((⌈(⍴,A)÷7),7)⍴,(((⌈(⍴,A)÷7)×7)↑A←□
[25]   →0
[26]  G:'ENTER AUTHORIZATIONS FOR FY',(⍕T),' AND CMF ',⍕C
[27]   A121←((⍴,A),1)⍴,A←□
[28]   →0
[29]  H:'ENTER AUTHORIZATIONS FOR FY',(⍕T+1),' AND CMF ',⍕C
[30]   A122←((⍴,A),1)⍴,A←□
[31]   →0
[32]  I:'ENTER AUTHORIZATIONS FOR FY',(⍕T+2),' AND CMF ',⍕C
[33]   A123←((⍴,A),1)⍴,A←□
[34]   →0
[35]  J:'ENTER INVENTORIES FOR FY',(⍕T),' AND CMF ',⍕C
[36]   INV12←((⍴,A),1)⍴,A←□
[37]   →0
[38]  M:'ENTER NAMES OF DUTY POSITIONS (INSIDE QUOTES) FOR CMF ',⍕C
[39]   PO13←(((⌈(⍴,A)÷7),7)⍴,(((⌈(⍴,A)÷7)×7)↑A←□
[40]   →0
[41]  N:'ENTER AUTHORIZATIONS FOR FY',(⍕T),' AND CMF ',⍕C
[42]   A131←((⍴,A),1)⍴,A←□
[43]   →0
[44]  O:'ENTER AUTHORIZATIONS FOR FY',(⍕T+1),' AND CMF ',⍕C
[45]   A132←((⍴,A),1)⍴,A←□
[46]   →0
[47]  P:'ENTER AUTHORIZATIONS FOR FY',(⍕T+2),' AND CMF ',⍕C
[48]   A133←((⍴,A),1)⍴,A←□
[49]   →0
[50]  Q:'ENTER INVENTORIES FOR FY',(⍕T),' AND CMF ',⍕C
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[51]  INV13←((⍴,A),1)⍴,A←⍞
[52]  →0
[53] R1:'ENTER NAMES OF DUTY POSITIONS (INSIDE QUOTES) FOR CMF ',▼C
[54]  PQ16←(((⌈(⍴,A)÷7),7)⍴,(((⌈(⍴,A)÷7)×7)↑A←⍞
[55]  →0
[56] S:'ENTER AUTHORIZATIONS FOR FY',(▼T),' AND CMF ',▼C
[57]  A161←((⍴,A),1)⍴,A←⍞
[58]  →0
[59] CN:'ENTER AUTHORIZATIONS FOR FY',(▼T+1),' AND CMF ',▼C
[60]  A162←((⍴,A),1)⍴,A←⍞
[61]  →0
[62] U:'ENTER AUTHORIZATIONS FOR FY',(▼T+2),' AND CMF ',▼C
[63]  A163←((⍴,A),1)⍴,A←⍞
[64]  →0
[65] V:'ENTER INVENTORIES FOR FY',(▼T),' AND CMF ',▼C
[66]  INV16←((⍴,A),1)⍴,A←⍞
[67]  →0
[68] W:'ENTER NAMES OF DUTY POSITIONS (INSIDE QUOTES) FOR CMF ',▼C
[69]  PQ18←(((⌈(⍴,A)÷7),7)⍴,(((⌈(⍴,A)÷7)×7)↑A←⍞
[70]  →0
[71] X:'ENTER AUTHORIZATIONS FOR FY',(▼T),' AND CMF ',▼C
[72]  A181←((⍴,A),1)⍴,A←⍞
[73]  →0
[74] Y:'ENTER AUTHORIZATIONS FOR FY',(▼T+1),' AND CMF ',▼C
[75]  A182←((⍴,A),1)⍴,A←⍞
[76]  →0
[77] Z:'ENTER AUTHORIZATIONS FOR FY',(▼T+2),' AND CMF ',▼C
[78]  A183←((⍴,A),1)⍴,A←⍞
[79]  →0
[80] AB:'ENTER INVENTORIES FOR FY',(▼T),' AND CMF ',▼C
[81]  INV18←((⍴,A),1)⍴,A←⍞
[82]  →0
[83] AC:'ENTER NAMES OF DUTY POSITIONS (INSIDE QUOTES) FOR CMF ',▼C
[84]  PQ19←(((⌈(⍴,A)÷7),7)⍴,(((⌈(⍴,A)÷7)×7)↑A←⍞
[85]  →0
[86] AD:'ENTER AUTHORIZATIONS FOR FY',(▼T),' AND CMF ',▼C
[87]  A191←((⍴,A),1)⍴,A←⍞
[88]  →0
[89] AE:'ENTER AUTHORIZATIONS FOR FY',(▼T+1),' AND CMF ',▼C
[90]  A192←((⍴,A),1)⍴,A←⍞
[91]  →0
[92] AF:'ENTER AUTHORIZATIONS FOR FY',(▼T+2),' AND CMF ',▼C
[93]  A193←((⍴,A),1)⍴,A←⍞
[94]  →0
[95] AG:'ENTER INVENTORIES FOR FY',(▼T),' AND CMF ',▼C
[96]  INV19←((⍴,A),1)⍴,A←⍞
[97]  →0
[98] AH:'ENTER NAMES OF DUTY POSITIONS (INSIDE QUOTES) FOR CMF ',▼C
[99]  PQ23←(((⌈(⍴,A)÷7),7)⍴,(((⌈(⍴,A)÷7)×7)↑A←⍞
[100]  →0
[101] AI:'ENTER AUTHORIZATIONS FOR FY',(▼T),' AND CMF ',▼C
[102]  A231←((⍴,A),1)⍴,A←⍞
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[103]  →0
[104] AJ:'ENTER AUTHORIZATIONS FOR FY',(▼T+1),' AND CMF ',▼C
[105]  A232←((⍴,A),1)⍴,A←⍞
[106]  →0
[107] AK:'ENTER AUTHORIZATIONS FOR FY',(▼T+2),' AND CMF ',▼C
[108]  A233←((⍴,A),1)⍴,A←⍞
[109]  →0
[110] AL1:'ENTER INVENTORIES FOR FY',(▼T),' AND CMF ',▼C
[111]  INV23←((⍴,A),1)⍴,A←⍞
[112]  →0
[113] AM:'ENTER NAMES OF DUTY POSITIONS (INSIDE QUOTES) FOR CMF ',▼C
[114]  PQ27←((⌈(⍴,A)÷7),7)⍴,((⌈(⍴,A)÷7)×7)↑A←⍞
[115]  →0
[116] AN:'ENTER AUTHORIZATIONS FOR FY',(▼T),' AND CMF ',▼C
[117]  A271←((⍴,A),1)⍴,A←⍞
[118]  →0
[119] AO:'ENTER AUTHORIZATIONS FOR FY',(▼T+1),' AND CMF ',▼C
[120]  A272←((⍴,A),1)⍴,A←⍞
[121]  →0
[122] AP:'ENTER AUTHORIZATIONS FOR FY',(▼T+2),' AND CMF ',▼C
[123]  A273←((⍴,A),1)⍴,A←⍞
[124]  →0
[125] AQ:'ENTER INVENTORIES FOR FY',(▼T),' AND CMF ',▼C
[126]  INV27←((⍴,A),1)⍴,A←⍞
[127]  →0
[128] AR:'ENTER NAMES OF DUTY POSITIONS (INSIDE QUOTES) FOR CMF ',▼C
[129]  PQ28←((⌈(⍴,A)÷7),7)⍴,((⌈(⍴,A)÷7)×7)↑A←⍞
[130]  →0
[131] AS:'ENTER AUTHORIZATIONS FOR FY',(▼T),' AND CMF ',▼C
[132]  A281←((⍴,A),1)⍴,A←⍞
[133]  →0
[134] AT:'ENTER AUTHORIZATIONS FOR FY',(▼T+1),' AND CMF ',▼C
[135]  A282←((⍴,A),1)⍴,A←⍞
[136]  →0
[137] AU:'ENTER AUTHORIZATIONS FOR FY',(▼T+2),' AND CMF ',▼C
[138]  A283←((⍴,A),1)⍴,A←⍞
[139]  →0
[140] AV:'ENTER INVENTORIES FOR FY',(▼T),' AND CMF ',▼C
[141]  INV28←((⍴,A),1)⍴,A←⍞
[142]  →0
[143] AW:'ENTER NAMES OF DUTY POSITIONS (INSIDE QUOTES) FOR CMF ',▼C
[144]  PQ29←((⌈(⍴,A)÷7),7)⍴,((⌈(⍴,A)÷7)×7)↑A←⍞
[145]  →0
[146] AX:'ENTER AUTHORIZATIONS FOR FY',(▼T),' AND CMF ',▼C
[147]  A291←((⍴,A),1)⍴,A←⍞
[148]  →0
[149] AY:'ENTER AUTHORIZATIONS FOR FY',(▼T+1),' AND CMF ',▼C
[150]  A292←((⍴,A),1)⍴,A←⍞
[151]  →0
[152] AZ:'ENTER AUTHORIZATIONS FOR FY',(▼T+2),' AND CMF ',▼C
[153]  A293←((⍴,A),1)⍴,A←⍞
[154]  →0
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[155] BA:'ENTER INVENTORIES FOR FY',(▼T),' AND CMF ',▼C
[156]  INV29←((⍴,A),1)⍴,A←⍞
[157]  →0
[158] BB:'ENTER NAMES OF DUTY POSITIONS (INSIDE QUOTES) FOR CMF ',▼C
[159]  PO31←((⌈(⍴,A)÷7),7)⍴,((⌈(⍴,A)÷7)×7)↑A←⍞
[160]  →0
[161] BC:'ENTER AUTHORIZATIONS FOR FY',(▼T),' AND CMF ',▼C
[162]  A311←((⍴,A),1)⍴,A←⍞
[163]  →0
[164] BD:'ENTER AUTHORIZATIONS FOR FY',(▼T+1),' AND CMF ',▼C
[165]  A312←((⍴,A),1)⍴,A←⍞
[166]  →0
[167] BE:'ENTER AUTHORIZATIONS FOR FY',(▼T+2),' AND CMF ',▼C
[168]  A313←((⍴,A),1)⍴,A←⍞
[169]  →0
[170] BF:'ENTER INVENTORIES FOR FY',(▼T),' AND CMF ',▼C
[171]  INV31←((⍴,A),1)⍴,A←⍞
[172]  →0
[173] BG:'ENTER NAMES OF DUTY POSITIONS (INSIDE QUOTES) FOR CMF ',▼C
[174]  PO33←((⌈(⍴,A)÷7),7)⍴,((⌈(⍴,A)÷7)×7)↑A←⍞
[175]  →0
[176] BH:'ENTER AUTHORIZATIONS FOR FY',(▼T),' AND CMF ',▼C
[177]  A331←((⍴,A),1)⍴,A←⍞
[178]  →0
[179] BI:'ENTER AUTHORIZATIONS FOR FY',(▼T+1),' AND CMF ',▼C
[180]  A332←((⍴,A),1)⍴,A←⍞
[181]  →0
[182] BJ:'ENTER AUTHORIZATIONS FOR FY',(▼T+2),' AND CMF ',▼C
[183]  A333←((⍴,A),1)⍴,A←⍞
[184]  →0
[185] BK:'ENTER INVENTORIES FOR FY',(▼T),' AND CMF ',▼C
[186]  INV33←((⍴,A),1)⍴,A←⍞
[187]  →0
[188] BL:'ENTER NAMES OF DUTY POSITIONS (INSIDE QUOTES) FOR CMF ',▼C
[189]  PO51←((⌈(⍴,A)÷7),7)⍴,((⌈(⍴,A)÷7)×7)↑A←⍞
[190]  →0
[191] BM:'ENTER AUTHORIZATIONS FOR FY',(▼T),' AND CMF ',▼C
[192]  A511←((⍴,A),1)⍴,A←⍞
[193]  →0
[194] BN:'ENTER AUTHORIZATIONS FOR FY',(▼T+1),' AND CMF ',▼C
[195]  A512←((⍴,A),1)⍴,A←⍞
[196]  →0
[197] BO:'ENTER AUTHORIZATIONS FOR FY',(▼T+2),' AND CMF ',▼C
[198]  A513←((⍴,A),1)⍴,A←⍞
[199]  →0
[200] BP:'ENTER INVENTORIES FOR FY',(▼T),' AND CMF ',▼C
[201]  INV51←((⍴,A),1)⍴,A←⍞
[202]  →0
[203] BQ:'ENTER NAMES OF DUTY POSITIONS (INSIDE QUOTES) FOR CMF ',▼C
[204]  PO54←((⌈(⍴,A)÷7),7)⍴,((⌈(⍴,A)÷7)×7)↑A←⍞
[205]  →0
[206] BR:'ENTER AUTHORIZATIONS FOR FY',(▼T),' AND CMF ',▼C
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[207]  A541←((⍴,A),1)⍴,A←⍞
[208]  →0
[209] BS:'ENTER AUTHORIZATIONS FOR FY',(⍕T+1),' AND CMF ',⍕C
[210]  A542←((⍴,A),1)⍴,A←⍞
[211]  →0
[212] BT:'ENTER AUTHORIZATIONS FOR FY',(⍕T+2),' AND CMF ',⍕C
[213]  A543←((⍴,A),1)⍴,A←⍞
[214]  →0
[215] BU:'ENTER INVENTORIES FOR FY',(⍕T),' AND CMF ',⍕C
[216]  INV54←((⍴,A),1)⍴,A←⍞
[217]  →0
[218] BV:'ENTER NAMES OF DUTY POSITIONS (INSIDE QUOTES) FOR CMF ',⍕C
[219]  PO55←(((⌈(⍴,A)÷7),7)⍴,(((⌈(⍴,A)÷7)×7)↑A←⍞
[220]  →0
[221] BW:'ENTER AUTHORIZATIONS FOR FY',(⍕T),' AND CMF ',⍕C
[222]  A551←((⍴,A),1)⍴,A←⍞
[223]  →0
[224] BX:'ENTER AUTHORIZATIONS FOR FY',(⍕T+1),' AND CMF ',⍕C
[225]  A552←((⍴,A),1)⍴,A←⍞
[226]  →0
[227] BY:'ENTER AUTHORIZATIONS FOR FY',(⍕T+2),' AND CMF ',⍕C
[228]  A553←((⍴,A),1)⍴,A←⍞
[229]  →0
[230] BZ:'ENTER INVENTORIES FOR FY',(⍕T),' AND CMF ',⍕C
[231]  INV55←((⍴,A),1)⍴,A←⍞
[232]  →0
[233] CD:'ENTER NAMES OF DUTY POSITIONS (INSIDE QUOTES) FOR CMF ',⍕C
[234]  PO63←(((⌈(⍴,A)÷7),7)⍴,(((⌈(⍴,A)÷7)×7)↑A←⍞
[235]  →0
[236] CE:'ENTER AUTHORIZATIONS FOR FY',(⍕T),' AND CMF ',⍕C
[237]  A631←((⍴,A),1)⍴,A←⍞
[238]  →0
[239] CF:'ENTER AUTHORIZATIONS FOR FY',(⍕T+1),' AND CMF ',⍕C
[240]  A632←((⍴,A),1)⍴,A←⍞
[241]  →0
[242] CG:'ENTER AUTHORIZATIONS FOR FY',(⍕T+2),' AND CMF ',⍕C
[243]  A633←((⍴,A),1)⍴,A←⍞
[244]  →0
[245] CH:'ENTER INVENTORIES FOR FY',(⍕T),' AND CMF ',⍕C
[246]  INV63←((⍴,A),1)⍴,A←⍞
[247]  →0
[248] CI:'ENTER NAMES OF DUTY POSITIONS (INSIDE QUOTES) FOR CMF ',⍕C
[249]  PO64←(((⌈(⍴,A)÷7),7)⍴,(((⌈(⍴,A)÷7)×7)↑A←⍞
[250]  →0
[251] CJ:'ENTER AUTHORIZATIONS FOR FY',(⍕T),' AND CMF ',⍕C
[252]  A641←((⍴,A),1)⍴,A←⍞
[253]  →0
[254] CK:'ENTER AUTHORIZATIONS FOR FY',(⍕T+1),' AND CMF ',⍕C
[255]  A642←((⍴,A),1)⍴,A←⍞
[256]  →0
[257] CL:'ENTER AUTHORIZATIONS FOR FY',(⍕T+2),' AND CMF ',⍕C
[258]  A643←((⍴,A),1)⍴,A←⍞
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[259]  →0
[260] CM:'ENTER INVENTORIES FOR FY',(▼T),' AND CMF ',▼C
[261]  INV64←((⍴,A),1)⍴,A←⍞
[262]  →0
[263] CO:'ENTER NAMES OF DUTY POSITIONS (INSIDE QUOTES) FOR CMF ',▼C
[264]  PO67←(((⌈(⍴,A)÷7),7)⍴,(((⌈(⍴,A)÷7)×7)↑A←⍞
[265]  →0
[266] CP:'ENTER AUTHORIZATIONS FOR FY',(▼T),' AND CMF ',▼C
[267]  A671←((⍴,A),1)⍴,A←⍞
[268]  →0
[269] CQ:'ENTER AUTHORIZATIONS FOR FY',(▼T+1),' AND CMF ',▼C
[270]  A672←((⍴,A),1)⍴,A←⍞
[271]  →0
[272] CR:'ENTER AUTHORIZATIONS FOR FY',(▼T+2),' AND CMF ',▼C
[273]  A673←((⍴,A),1)⍴,A←⍞
[274]  →0
[275] CS:'ENTER INVENTORIES FOR FY',(▼T),' AND CMF ',▼C
[276]  INV67←((⍴,A),1)⍴,A←⍞
[277]  →0
       ∇
       .
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       ∇DAT2[⍞]∇
       ∇ R←CC DAT2 C;AL;A;C;T
[1]   ⍝ THIS FUNCTION IS USED FOR THE CREATION OF REQUIRED VECTORS.
[2]    T←C[1]
[3]    C←C[2]
[4]    AL←'PO71A171A271A371IN71PO74A174A274A374IN74PO76A176A276A376I
[5]    →(4=+/(((⍴,AL)÷4),4)⍴((⍴,AL)⍴CC)=AL)/L,B,K,D,E,F,G,H,I,J,M,N,
[6]    'THIS CMF IS NOT INCLUDED IN THE NUMBERS I SPECIFIED.'
[7]    →0
[8]   L:'ENTER NAMES OF DUTY POSITIONS (INSIDE QUOTES) FOR CMF ',▼C
[9]    PO71←(((⌈(⍴,A)÷7),7)⍴,(((⌈(⍴,A)÷7)×7)↑A←⍞
[10]   →0
[11]  B:'ENTER AUTHORIZATIONS FOR FY',(▼T),' AND CMF ',▼C
[12]   A711←((⍴,A),1)⍴,A←⍞
[13]   →0
[14]  K:'ENTER AUTHORIZATIONS FOR FY',(▼T+1),' AND CMF ',▼C
[15]   A712←((⍴,A),1)⍴,A←⍞
[16]   →0
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[17] D:'ENTER AUTHORIZATIONS FOR FY',(⍕T+2),' AND CMF ',⍕C
[18]  A713←((⍴,A),1)⍴,A←⍞
[19]  →0
[20] E:'ENTER INVENTORIES FOR FY',(⍕T),' AND CMF ',⍕C
[21]  INV71←((⍴,A),1)⍴,A←⍞
[22]  →0
[23] F:'ENTER NAMES OF DUTY POSITIONS (INSIDE QUOTES) FOR CMF ',⍕C
[24]  PQ74←((⌈(⍴,A)÷7),7)⍴,((⌈(⍴,A)÷7)×7)↑A←⍞
[25]  →0
[26] G:'ENTER AUTHORIZATIONS FOR FY',(⍕T),' AND CMF ',⍕C
[27]  A741←((⍴,A),1)⍴,A←⍞
[28]  →0
[29] H:'ENTER AUTHORIZATIONS FOR FY',(⍕T+1),' AND CMF ',⍕C
[30]  A742←((⍴,A),1)⍴,A←⍞
[31]  →0
[32] I:'ENTER AUTHORIZATIONS FOR FY',(⍕T+2),' AND CMF ',⍕C
[33]  A743←((⍴,A),1)⍴,A←⍞
[34]  →0
[35] J:'ENTER INVENTORIES FOR FY',(⍕T),' AND CMF ',⍕C
[36]  INV74←((⍴,A),1)⍴,A←⍞
[37]  →0
[38] M:'ENTER NAMES OF DUTY POSITIONS (INSIDE QUOTES) FOR CMF ',⍕C
[39]  PQ76←((⌈(⍴,A)÷7),7)⍴,((⌈(⍴,A)÷7)×7)↑A←⍞
[40]  →0
[41] N:'ENTER AUTHORIZATIONS FOR FY',(⍕T),' AND CMF ',⍕C
[42]  A761←((⍴,A),1)⍴,A←⍞
[43]  →0
[44] O:'ENTER AUTHORIZATIONS FOR FY',(⍕T+1),' AND CMF ',⍕C
[45]  A762←((⍴,A),1)⍴,A←⍞
[46]  →0
[47] P:'ENTER AUTHORIZATIONS FOR FY',(⍕T+2),' AND CMF ',⍕C
[48]  A763←((⍴,A),1)⍴,A←⍞
[49]  →0
[50] Q:'ENTER INVENTORIES FOR FY',(⍕T),' AND CMF ',⍕C
[51]  INV76←((⍴,A),1)⍴,A←⍞
[52]  →0
[53] R1:'ENTER NAMES OF DUTY POSITIONS (INSIDE QUOTES) FOR CMF ',⍕C
[54]  PQ79←((⌈(⍴,A)÷7),7)⍴,((⌈(⍴,A)÷7)×7)↑A←⍞
[55]  →0
[56] S:'ENTER AUTHORIZATIONS FOR FY',(⍕T),' AND CMF ',⍕C
[57]  A791←((⍴,A),1)⍴,A←⍞
[58]  →0
[59] BV:'ENTER AUTHORIZATIONS FOR FY',(⍕T+1),' AND CMF ',⍕C
[60]  A792←((⍴,A),1)⍴,A←⍞
[61]  →0
[62] U:'ENTER AUTHORIZATIONS FOR FY',(⍕T+2),' AND CMF ',⍕C
[63]  A793←((⍴,A),1)⍴,A←⍞
[64]  →0
[65] V:'ENTER INVENTORIES FOR FY',(⍕T),' AND CMF ',⍕C
[66]  INV79←((⍴,A),1)⍴,A←⍞
[67]  →0
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[68] W:'ENTER NAMES OF DUTY POSITIONS (INSIDE QUOTES) FOR CMF ',⍕C
[69]  PO81←(((⌈(⍴,A)÷7),7)⍴,(((⌈(⍴,A)÷7)×7)↑A←⍞
[70]  →0
[71] X:'ENTER AUTHORIZATIONS FOR FY',(⍕T),' AND CMF ',⍕C
[72]  A811←((⍴,A),1)⍴,A←⍞
[73]  →0
[74] Y:'ENTER AUTHORIZATIONS FOR FY',(⍕T+1),' AND CMF ',⍕C
[75]  A812←((⍴,A),1)⍴,A←⍞
[76]  →0
[77] Z:'ENTER AUTHORIZATIONS FOR FY',(⍕T+2),' AND CMF ',⍕C
[78]  A813←((⍴,A),1)⍴,A←⍞
[79]  →0
[80] AB:'ENTER INVENTORIES FOR FY',(⍕T),' AND CMF ',⍕C
[81]  INV81←((⍴,A),1)⍴,A←⍞
[82]  →0
[83] AC:'ENTER NAMES OF DUTY POSITIONS (INSIDE QUOTES) FOR CMF ',⍕C
[84]  PO84←(((⌈(⍴,A)÷7),7)⍴,(((⌈(⍴,A)÷7)×7)↑A←⍞
[85]  →0
[86] AD:'ENTER AUTHORIZATIONS FOR FY',(⍕T),' AND CMF ',⍕C
[87]  A841←((⍴,A),1)⍴,A←⍞
[88]  →0
[89] AE:'ENTER AUTHORIZATIONS FOR FY',(⍕T+1),' AND CMF ',⍕C
[90]  A842←((⍴,A),1)⍴,A←⍞
[91]  →0
[92] AF:'ENTER AUTHORIZATIONS FOR FY',(⍕T+2),' AND CMF ',⍕C
[93]  A843←((⍴,A),1)⍴,A←⍞
[94]  →0
[95] AG:'ENTER INVENTORIES FOR FY',(⍕T),' AND CMF ',⍕C
[96]  INV84←((⍴,A),1)⍴,A←⍞
[97]  →0
[98] AH:'ENTER NAMES OF DUTY POSITIONS (INSIDE QUOTES) FOR CMF ',⍕C
[99]  PO91←(((⌈(⍴,A)÷7),7)⍴,(((⌈(⍴,A)÷7)×7)↑A←⍞
[100]  →0
[101] AI:'ENTER AUTHORIZATIONS FOR FY',(⍕T),' AND CMF ',⍕C
[102]  A911←((⍴,A),1)⍴,A←⍞
[103]  →0
[104] AJ:'ENTER AUTHORIZATIONS FOR FY',(⍕T+1),' AND CMF ',⍕C
[105]  A912←((⍴,A),1)⍴,A←⍞
[106]  →0
[107] AK:'ENTER AUTHORIZATIONS FOR FY',(⍕T+2),' AND CMF ',⍕C
[108]  A913←((⍴,A),1)⍴,A←⍞
[109]  →0
[110] AL1:'ENTER INVENTORIES FOR FY',(⍕T),' AND CMF ',⍕C
[111]  INV91←((⍴,A),1)⍴,A←⍞
[112]  →0
[113] AM:'ENTER NAMES OF DUTY POSITIONS (INSIDE QUOTES) FOR CMF ',⍕C
[114]  PO92←(((⌈(⍴,A)÷7),7)⍴,(((⌈(⍴,A)÷7)×7)↑A←⍞
[115]  →0
[116] AN:'ENTER AUTHORIZATIONS FOR FY',(⍕T),' AND CMF ',⍕C
[117]  A921←((⍴,A),1)⍴,A←⍞
[118]  →0
[119] AO:'ENTER AUTHORIZATIONS FOR FY',(⍕T+1),' AND CMF ',⍕C
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[120]  A922←((⍴,A),1)⍴,A←⍞
[121]  →0
[122] AP:'ENTER AUTHORIZATIONS FOR FY',(▼T+2),' AND CMF ',▼C
[123]  A923←((⍴,A),1)⍴,A←⍞
[124]  →0
[125] AQ:'ENTER INVENTORIES FOR FY',(▼T),' AND CMF ',▼C
[126]  INV92←((⍴,A),1)⍴,A←⍞
[127]  →0
[128] AR:'ENTER NAMES OF DUTY POSITIONS (INSIDE QUOTES) FOR CMF ',▼C
[129]  PO94←((⌈(⍴,A)÷7),7)⍴,((⌈(⍴,A)÷7)×7)↑A←⍞
[130]  →0
[131] AS:'ENTER AUTHORIZATIONS FOR FY',(▼T),' AND CMF ',▼C
[132]  A941←((⍴,A),1)⍴,A←⍞
[133]  →0
[134] AT:'ENTER AUTHORIZATIONS FOR FY',(▼T+1),' AND CMF ',▼C
[135]  A942←((⍴,A),1)⍴,A←⍞
[136]  →0
[137] AU:'ENTER AUTHORIZATIONS FOR FY',(▼T+2),' AND CMF ',▼C
[138]  A943←((⍴,A),1)⍴,A←⍞
[139]  →0
[140] AV:'ENTER INVENTORIES FOR FY',(▼T),' AND CMF ',▼C
[141]  INV94←((⍴,A),1)⍴,A←⍞
[142]  →0
[143] AW:'ENTER NAMES OF DUTY POSITIONS (INSIDE QUOTES) FOR CMF ',▼C
[144]  PO95←((⌈(⍴,A)÷7),7)⍴,((⌈(⍴,A)÷7)×7)↑A←⍞
[145]  →0
[146] AX:'ENTER AUTHORIZATIONS FOR FY',(▼T),' AND CMF ',▼C
[147]  A951←((⍴,A),1)⍴,A←⍞
[148]  →0
[149] AY:'ENTER AUTHORIZATIONS FOR FY',(▼T+1),' AND CMF ',▼C
[150]  A952←((⍴,A),1)⍴,A←⍞
[151]  →0
[152] AZ:'ENTER AUTHORIZATIONS FOR FY',(▼T+2),' AND CMF ',▼C
[153]  A953←((⍴,A),1)⍴,A←⍞
[154]  →0
[155] BA:'ENTER INVENTORIES FOR FY',(▼T),' AND CMF ',▼C
[156]  INV95←((⍴,A),1)⍴,A←⍞
[157]  →0
[158] BG:'ENTER NAMES OF DUTY POSITIONS (INSIDE QUOTES) FOR CMF ',▼C
[159]  PO96←((⌈(⍴,A)÷7),7)⍴,((⌈(⍴,A)÷7)×7)↑A←⍞
[160]  →0
[161] BH:'ENTER AUTHORIZATIONS FOR FY',(▼T),' AND CMF ',▼C
[162]  A961←((⍴,A),1)⍴,A←⍞
[163]  →0
[164] BI:'ENTER AUTHORIZATIONS FOR FY',(▼T+1),' AND CMF ',▼C
[165]  A962←((⍴,A),1)⍴,A←⍞
[166]  →0
[167] BJ:'ENTER AUTHORIZATIONS FOR FY',(▼T+2),' AND CMF ',▼C
[168]  A963←((⍴,A),1)⍴,A←⍞
[169]  →0
[170] BK:'ENTER INVENTORIES FOR FY',(▼T),' AND CMF ',▼C
[171]  INV96←((⍴,A),1)⍴,A←⍞
```

```
[172]  →0
[173] BL:'ENTER NAMES OF DUTY POSITIONS (INSIDE QUOTES) FOR CMF ',▼C
[174]  PQ97←(((⌈(⍴,A)÷7),7)⍴,(((⌈(⍴,A)÷7)×7)↑A←⍞
[175]  →0
[176] BM:'ENTER AUTHORIZATIONS FOR FY',(▼T),' AND CMF ',▼C
[177]  A971←((⍴,A),1)⍴,A←⍞
[178]  →0
[179] BN:'ENTER AUTHORIZATIONS FOR FY',(▼T+1),' AND CMF ',▼C
[180]  A972←((⍴,A),1)⍴,A←⍞
[181]  →0
[182] BO:'ENTER AUTHORIZATIONS FOR FY',(▼T+2),' AND CMF ',▼C
[183]  A973←((⍴,A),1)⍴,A←⍞
[184]  →0
[185] BP:'ENTER INVENTORIES FOR FY',(▼T),' AND CMF ',▼C
[186]  INV97←((⍴,A),1)⍴,A←⍞
[187]  →0
[188] BQ:'ENTER NAMES OF DUTY POSITIONS (INSIDE QUOTES) FOR CMF ',▼C
[189]  PQ98←(((⌈(⍴,A)÷7),7)⍴,(((⌈(⍴,A)÷7)×7)↑A←⍞
[190]  →0
[191] BR:'ENTER AUTHORIZATIONS FOR FY',(▼T),' AND CMF ',▼C
[192]  A981←((⍴,A),1)⍴,A←⍞
[193]  →0
[194] BS:'ENTER AUTHORIZATIONS FOR FY',(▼T+1),' AND CMF ',▼C
[195]  A982←((⍴,A),1)⍴,A←⍞
[196]  →0
[197] BT:'ENTER AUTHORIZATIONS FOR FY',(▼T+2),' AND CMF ',▼C
[198]  A983←((⍴,A),1)⍴,A←⍞
[199]  →0
[200] BU:'ENTER INVENTORIES FOR FY',(▼T),' AND CMF ',▼C
[201]  INV98←((⍴,A),1)⍴,A←⍞
[202]  →0
       ∇
```

2. Listing of the Function "DATAMAN".

```
      ∇DATAMAN[□]∇
     ∇ R←DATAMAN;A;I;M;NEW;TYR;W
[1]   'THIS FUNCTION DOES THE FOLLOWING:'
[2]   'ADDITION OF AN ELEMENT, DELETION OF AN ELEMENT, AND REPLACEMENT OF'
[3]   'THE VALUE OF AN ELEMENT IN AN EXISTING VECTOR OF DATA.'
[4]   ' '
[5]   ' '
[6]   'ENTER THE NAME OF VECTOR YOU WANT TO CHANGE'
[7]   M←□
[8]   →THE
[9]  CP0:'IS THIS A VECTOR OF NAMES? ENTER Y OR N'
[10]  TYR←□
[11]  →TRY×⍳(TYR='Y')
[12]  M←((⍴,M),1)⍴,M
[13]  →THE
[14] TRY:M←(((⌈(⍴,M)÷7),7)⍴,M
[15] THE:→CP0×⍳(1=⍴⍴M)
[16] NM:'ENTER A, D, OR R TO ADD A NEW ELEMENT, DELETE AN EXISTING'
[17]  'ELEMENT, OR REPLACE THE VALUE OF AN ESEMENT RESPECTIVELY:'
[18]  W←□
[19]  →('A','D','R')/ADD,DEL,REP
[20]  'YOU HAD TO ENTER A, D, OR R; RETRY.'
[21]  →NM
[22] ADD:'ENTER LINE NUMBER AFTER WHICH YOU WANT TO ADD A LINE'
[23]  I←□
[24]  →POI×⍳((I≥0)∧I≤(⍴M)[1])
[25]  'INVALID LINE NUMBER; RETRY.'
[26]  →ADD
[27] POI:→CD×⍳(7=(⍴M)[2])
[28]  'ENTER THE VALUE OF THE NEW LINE:'
[29]  NEW←  1  1 ⍴A←□
[30]  R←M←((I,1)↑M),[1] NEW,[1](I,0)↓M
[31]  →END
[32] CD:'ENTER THE NAME OF THE NEW DUTY POSITION(IN QUOTES)'
[33]  NEW←  1  7 ⍴,7↑A←□
[34]  R←M←((I,7)↑M),[1] NEW,[1](I,0)↓M
[35]  →END
[36] DEL:'ENTER POSITION OF LINE YOU WANT TO DELETE'
[37]  I←□
[38]  →POT×⍳((I>0)∧I≤(⍴M)[1])
[39]  'INVALID LINE NUMBER; RETRY.'
[40]  →DEL
[41] POT:→CD1×⍳(7=(⍴M)[2])
[42]  R←M←(((I-1),1)↑M),[1](-(((⍴M)[1])-I),1)↓M
[43]  →END
[44] CD1:R←M←(((I-1),7)↑M),[1](-(((⍴M)[1])-I),7)↓M
[45]  →END
[46] REP:'ENTER POSITION WHOSE VALUE HAS TO CHANGE'
[47]  I←□
[48]  →POV×⍳((I>0)∧I≤(⍴M)[1])
[49]  'INVALID LINE NUMBER; RETRY.'
[50]  →REP
[51] POV:→CD2×⍳(7=(⍴M)[2])
[52]  'ENTER NEW VALUE(1NUMBER)'
[53]  M[I;]←1↑,A←□
[54]  R←M
[55]  →END
[56] CD2:'ENTER NEW NAME IN QUOTES'
[57]  M[I;]←(1 7)⍴7↑,A←□
[58]  R←M
[59]  ' '
[60] END:'MORE CHANGES? ENTER Y OR N'
[61]  TYR←□
[62]  →NM×⍳(TYR='Y')
      ∇
```

3. Listing of the Function "MATRIX".

```
      ∇MATRIX[□]∇
      ∇ R←MATRIX P;C;FRO;FROM;J;K;TO;TOM;I;M;PS;SS;PV;PP;SP;SV;MAX;TP;TYR;TV
[1]   'THIS FUNCTION PRODUCES TRANSITION MATRICES. TO GET CORRECT RESULTS'
[2]   'ELEMENTS  OF THE  ARGUMENT (VECTOR  OF DUTY  POSITIONS) MUST BE IN'
[3]   'ALPHANUMERIC  ORDER OF MOS, INCREASING ORDER OF SL AND P,V,S ORDER'
[4]   'OF SQI.'
[5]   ' '
[6]   ' '
[7]   MAX←I←⌈(⍴,P)÷7
[8]   P←(I,7)⍴,P
[9]   →PRT×⍳(I=+/(P[;6]='P'),(P[;6]='V'),P[;6]='S')
[10]  'CHECK THE VECTOR OF DUTY POSITIONS; SQI DIFFERENT THAN P,V,S IS FOUND.'
[11]  →0
[12] PRT:M←(I,I)⍴0
[13]  C←0
[14]  'ARE THERE ANY CHANGES IN MOS DUE TO PROMOTIONS IN THIS CMF?'
[15]  'ENTER Y OR N'
[16]  TYR←□
[17]  →SDS×⍳(TYR≠'Y')
[18]  FRO←TOM←⍳0
[19] SD1:'ENTER MOS/SL FROM WHICH THE PROMOTION ORIGINATES(E.G.11H40);'
[20]  'IF YOU ARE FINISHED ENTER F:'
[21]  FROM←□
[22]  →KED×⍳((+/(5↑FROM)='F    ')=5)
[23]  'ENTER MOS/SL TO WHICH THE PROMOTION IS MADE(E.G.11B50):'
[24]  TO←□
[25]  FRO←FRO,FROM
[26]  TOM←TOM,TO
[27]  C←C+1
[28]  →SD1
[29] KED:TOM←(([⌈(⍴,TOM)÷5),5)⍴,TOM
[30]  FRO←(([⌈(⍴,FRO)÷5),5)⍴,FRO
[31] ⍝ STAYING RATES FOR PARASHUTISTS WHEN TRANSITIONS TO V CANNOT OCCUR ARE:
[32] SDS:SP← 0.523 0.531 0.697 0.722 0.68
[33] ⍝ STAYING RATES FOR SPECIALISTS ARE:
[34]  SS← 0.384 0.43 0.718 0.789 0.757
[35] ⍝ STAYING RATES FOR PARASHUTISTS WHEN TRANSITIONS TO V ARE POSSIBLE ARE:
[36]  SPW← 0.502 0.516 0.688 0.718 0.677
[37] ⍝ STAYING RATES FOR RANGERS ARE:(ALWAYS IS POSSIBLE TRANSITION TO P).
[38]  SVW←SV← 0.57 0.366 0.667 0.682 0.726
[39] ⍝ PROMOTION RATES FOR PARASHUTISTS ARE:
[40]  PP← 0.171 0.215 0.146 0.108
[41] ⍝ PROMOTION RATES FOR RANGERS ARE:
[42]  PV← 0.146 0.273 0.144 0.159
[43] ⍝ PROMOTION RATES FOR SPECIALISTS ARE:
[44]  PS← 0.435 0.449 0.217 0.124
[45] ⍝ TRANSITION RATES FROM P TO V WITH PROMOTION ARE:
[46]  TPW← 0.004 0.006 0 0 0
[47] ⍝ TRANSITION RATES FROM V TO P WITH PROMOTION ARE:
[48]  TVW← 0.01 0.008 0.016 0 0
[49] ⍝ TRANSITION RATES FROM P TO V W/O PROMOTION ARE:
[50]  TP← 0.017 0.009 0.009 0.004 0.003
[51] ⍝ TRANSITION RATES FROM V TO P W/O PROMOTION ARE:
[52]  TV← 0.003 0.011 0.021 0.024 0.014
[53]  →C01×⍳('P'≠(P[I;6]))
[54]  M[I;I]←SP[⍎(P[I;4])]
[55]  →C0
[56] C01:→C02×⍳('V'≠(P[;6])[I])
[57]  M[I;I]←SV[⍎(P[I;4])]
[58]  J←0
[59]  →TS
[60] C02:M[I;I]←SS[⍎(P[I;4])]
[61]  →C0
```

```
[62] NEW:I←I-1
[63]  →KO×ι('P'≠P[I;6])
[64]  →PRP×ι(0≠M[I;I])
[65]  M[I;I]←SP[⍎(P[I;4])]
[66] PRP:→CO×ι((((+/(P[I;])=P[I+1;])≠6)∨((⍎P[I;4])≠(⍎P[(I+1);4])-1))∨5=P[I;4])
[67]  M[I;I+1]←PP[⍎(P[I;4])]
[68]  →CO
[69] KO:→KO1×ι('V'≠P[I;6])
[70]  M[I;I]←SV[⍎(P[I;4])]
[71]  J←0
[72] TS:J←J+1
[73]  →TE×ι(((P[I;1]≠P[J;1])∨(P[I;2]≠P[J;2]))∨P[I;3]≠P[J;3])
[74]  →TS×ι(P[I;6]=P[J;6])
[75]  M[J;J]←SPW[⍎(P[J;4])]
[76]  →T1×ι((⍎P[I;4])≠(⍎P[J;4])-1)
[77]  M[I;J]←TVW[(⍎P[I;4])]
[78] T1:→T3×ι((⍎P[I;4])≠(⍎P[J;4])+1)
[79]  M[J;I]←TPW[(⍎P[J;4])]
[80] T3:→T4×ι((⍎P[J;4])≠(⍎P[I;4])-1)
[81]  M[J;I]←TPW[(⍎P[J;4])]
[82] T4:→T2×ι((⍎P[J;4])≠(⍎P[I;4])+1)
[83]  M[I;J]←TVW[(⍎P[I;4])]
[84] T2:→TE×ι((⍎P[I;4])≠(⍎P[J;4]))
[85]  M[I;J]←TV[(⍎P[I;4])]
[86]  M[J;I]←TP[(⍎P[J;4])]
[87]  M[J;J]←SPW[⍎(P[J;4])]
[88] TE:→TS×ι(J<I-1)
[89]  →CO×ι(I=MAX)
[90]  →CO×ι((((+/(P[I;])=P[I+1;])≠6)∨((⍎P[I;4])≠(⍎P[(I+1);4])-1))∨5=P[I;4])
[91]  M[I;I+1]←PV[⍎(P[I;4])]
[92]  →CO
[93] KO1:M[I;I]←SS[⍎(P[I;4])]
[94]  →CO×ι((((+/(P[I;])=P[I+1;])≠6)∨((⍎P[I;4])≠(⍎P[(I+1);4])-1))∨5=P[I;4])
[95]  M[I;I+1]←PS[⍎(P[I;4])]
[96] CO:→CRO×ι(C=0)
[97]  J←0
[98] TRS:J←J+1
[99]  →TEOL×ι((+/((,TOM[J;])=(5↑,P[I;])))≠5)
[100]  K←0
[101] CHAN:K←K+1
[102]  →ALL×ι(I=K)
[103]  →ALL×ι((((+/(((FRO[J;]),(¯2↑,P[K;]))=P[K;]))≠7)∨(P[K;6]≠P[I;6]))
[104]  →GG×ι(P[K;6]≠'S')
[105]  M[K;I]←PS[⍎(P[K;4])]
[106]  →ALL
[107] GG:→GG1×ι(P[K;6]≠'P')
[108]  M[K;I]←PP[⍎(P[K;4])]
[109]  →ALL
[110] GG1:M[K;I]←PV[⍎(P[K;4])]
[111] ALL:→CHAN×ι(K<MAX)
[112] TEOL:→TRS×ι(C>J)
[113] CRO:→NEW×ι(I>2)
[114]  →COD×ι('P'≠P[1;6])
[115]  →KRI×ι(0≠M[1;1])
[116]  M[1;1]←SP[⍎(P[1;4])]
[117] KRI:→EN×ι((((+/(P[1;])=P[2;])≠6)∨((⍎P[1;4])≠(⍎P[2;4])-1))∨5=P[1;4])
[118]  M[1;2]←PP[⍎(P[1;4])]
[119]  →EN
[120] COD:M[1;1]←SS[⍎(P[1;4])]
[121]  →EN×ι((((+/(P[1;])=P[2;])≠6)∨((⍎P[1;4])≠(⍎P[2;4])-1))∨5=P[1;4])
[122]  M[1;2]←PS[⍎(P[1;4])]
[123] EN:R←M
      ∇
```

4. Listing of the Functions "AIRBORNE", "DATA", "VALUE",

```
      ▽AIRBORNE[□]▽
     ▽ AIRBORNE;POS;W;TYRR;STEADY;NCMF;NCMFS;SHOOC;YEA;YEARS;BUDGE;CORA
[1]   ⍝THIS IS A DRIVER FUNCTION WHICH IMPLEMENTS THE MAIN MODEL.
[2]    'IN ORDER TO USE THE MODEL YOU  NEED THE FOLLOWING INPUT:'
[3]    '(1) VECTORS OF NAMES OF DUTY POSITIONS FOR EACH CMF  STORED UNDER THE'
[4]    '    NAME ''PO..'',  WHERE ''..''  IS THE  CMF NUMBER. THE INDIVIDUAL DUTY'
[5]    '    POSITIONS  ARE ARRANGED IN  ALPHANUMERIC ORDER OF MOS, INCREASING'
[6]    '    ORDER OF SL, AND P,V,S ORDER OF SQI.'
[7]    '(2) VECTORS OF AUTHORIZATIONS  FOR  TWO  OR  THREE FISCAL  YEARS  AND'
[8]    '    VECTORS OF INVENTORIES FOR THE FIRST  FISCAL  YEAR FOR  EACH  CMF'
[9]    '    CORRESPONDING TO THE DUTY POSITIONS GIVEN ABOVE. THESE ARE STORED'
[10]   '    UNDER THE NAMES: A..1, A..2, A..3 AND INV.. EACH OF WHICH  CAN BE'
[11]   '    CREATED  USING  THE  FUNCTION ''DATAINPUT'', OR UPDATED  USING  THE'
[12]   '    FUNCTION ''DATAMAN''.'
[13]   '(3) A TRANSITION MATRIX FOR EACH CMF.THIS MATRIX CAN BE CREATED USING'
[14]   '    THE FUNCTION ''MATRIX''; E.G. FOR CMF 11 TYPE:''M11←MATRIX PO11'' '
[15]   ' '
[16]   'DO YOU WANT TO ENTER DATA?  ENTER Y OR N '
[17]   T←□
[18]   →WER×⍳(T='Y')
[19]   →0
[20]  WER: ⍝******** INPUT DATA **************
[21]   T←I←0
[22]   'INPUT DESIRED NUMBER OF FY''S FOR WHICH YOU WANT'
[23]   'TRAINING REQUIREMENTS (1 OR 2). '
[24]   STEADY←YEARS←□
[25]   'IDENTIFY CMF''S YOU WANT TO WORK WITH (E.G. 11 13 ETC.)'
[26]   'TYPING ''ALL'' WILL PROVIDE CMF''S:11 12 13 16 18 19 23 27 28 29 31 33'
[27]   '51 54 55 63 64 67 71 74 76 79 81 84 91 92 94 95 96 97 98'
[28]   NCMFS←,□
[29]   NCMF←⍴NCMFS
[30]   DIME←CP←CV←POS←CS←AP←AV←AS←AP1←AV1←AS1←AP2←AV2←AS2←NO←AWP←AWV←AWS←MA←⍳0
[31]   'IDENTIFY CMF NUMBERS FOR WHICH YOU WOULD LIKE TO SEE THE DATA:'
[32]   '(YOU CAN ENTER ''ALL''. ENTERING 0 YOU WILL SEE NONE.)'
[33]   SEE←,□
[34]   'ENTER THE FY  TO WHICH THE CURRENT INVENTORY REFERS: (2 DIGITS)'
[35]   YEA←□
[36]  NEO:I←I+1
[37]   DATA(NCMFS[I])
[38]  WWWW:
[39]   →WWW1×⍳(1≠+/NCMFS[I]=SEE)
[40]   'CMF',▼NCMFS[I]
[41]   'DUTY      AUTHORIZATIONS  INVENTORY'
[42]   REC←((SE←(⍴,POSI)↑7),7)⍴,POSI
[43]   →GGRR×⍳(YEARS=1)
[44]   'POSITION  FY',(▼YEA),' FY',(▼YEA+1),' FY',(▼YEA+2),'     FY',▼YEA
[45]   '--------  ----- ----- -----     ----'
[46]   SE←⍉(4,SE)⍴,(,AUT),(,AUT1),(,AUT2),(,INV)
[47]   SE← 7 0 5 0 5 0 9 0 ▼SE
[48]   REC,SE
[49]   →RWTF
[50]  GGRR:'POSITION  FY',(▼YEA),'   FY',(▼YEA+1),'       FY',▼YEA
[51]   '--------  -----   -----       -----'
[52]   SE←⍉(3,SE)⍴,(,AUT),(,AUT1),(,INV)
[53]   SE← 7 0 7 0 11 0 ▼SE
[54]   REC,SE
[55]   ' '
[56]   ' '
[57]  RWTF:'DO YOU WANT TO CONTINUE WITH MODEL(ENTER Y) OR QUIT (ENTER N)?'
[58]   TYR←□
[59]   ' '
[60]   ' '
[61]   ' '
[62]   →WWW1×⍳(TYR='Y')
[63]   →0
[64]  WWW1:MA←MA,(,MAT)
[65]   DIME←DIME,DDD
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```
[66]  POS←POS,(,POSI)
[67]  CP←CP,(DDD[1]+,INV)
[68]  CV←CV,(DDD[2]+DDD[1]+,INV)
[69]  CS←CS,((-DDD[3])+,INV)
[70]  AP←AP,(DDD[1]+,AUT)
[71]  AV←AV,(DDD[2]+DDD[1]+,AUT)
[72]  AS←AS,((-DDD[3])+,AUT)
[73]  AP1←AP1,(DDD[1]+,AUT1)
[74]  AV1←AV1,(DDD[2]+DDD[1]+,AUT1)
[75]  AS1←AS1,((-DDD[3])+,AUT1)
[76]  →TWO1×⍳(YEARS=1)
[77]  AP2←AP2,(DDD[1]+,AUT2)
[78]  AV2←AV2,(DDD[2]+DDD[1]+,AUT2)
[79]  AS2←AS2,((-DDD[3])+,AUT2)
[80] TWO1:NO←NO,(,INV)
[81]  →NEO×⍳(I<NCMF)
[82]  KEEPA←A←AP,AV,AS
[83]  KEEPA1←A1←AP1,AV1,AS1
[84]  →THRE×⍳(YEARS=1)
[85]  A2←AP2,AV2,AS2
[86] THRE:TC←CP,CV,CS
[87]  KTC←A-TC
[88]  KNO←NO
[89]  QP←⍉(4,(,⍴,NO))⍴A,(A-TC),A1,A
[90]  DIM←(I,3)⍴DIME
[91]  VALUE YEARS
[92]  REC←((⍳(+/+/DIM))>0)×0
[93] NEWYEAR:T←T+1
[94]  NN←NNN←⍳0
[95]  I←0
[96]  NOO←CP←CV←CS←⍳0
[97] ********** CALL FORCASTING MODEL ************
[98] NEW:I←I+1
[99]  DDD←NU←DIM[I;]
[100]  QQP←(+/NU)+(+/NN)+NO
[101]  QQP1←(+/NU)+(+/NN)+REC
[102]  NN←NN,+/NU
[103]  NUN←(+/NU)*2
[104]  MU←NUN+(+/NNN)+MA
[105]  NNN←NNN,NUN
[106]  QQP←⍉(2,(⍴,QQP))⍴QQP,QQP1
[107]  INV←MU FORCAST QQP
[108]  NOO←NOO,INV
[109]  CP←CP,(DDD[1])+,INV
[110]  CV←CV,(DDD[2])+(DDD[1])+,INV
[111]  CS←CS,((-DDD[3])+,INV)
[112]  →NEW×⍳(I<NCMF)
[113]  TC←CP,CV,CS
[114]  →FOUR×⍳(T=1)
[115]  A←A1
[116]  A1←A2
[117]  QP[;1]←A
[118]  QP[;2]←A-NOX
[119]  QP[;3]←A1
[120] FOUR:QP[;4]←A1-TC
[121]  SE←(+/⍉DIM),CORA,COS
[122]  →BUBU×⍳(YEARS=1)
[123]  BUDGE←BBB[T]
[124]  →PARA
[125] BUBU:BUDGE←BBB
[126] PARA:' '
[127]  ' '
[128]  'DO YOU WANT TO SEE REQUIRED SCHOOL CAPACITY AND BUDGET TO CREATE INVENTORY'
[129]  'UP TO A MINIMUM PERCENTAGE COVERAGE OF AUTHORIZATIONS AT END OF FY',(▼YEA+T-1),'?'
[130]  'ENTER Y OR N'
[131]  TYR←⍞
[132]  →PARA2×⍳(TYR≠'Y')
[133]  SE SCHOOL QP
[134]  ' '
[135]  ' '
```

```
[136]  'DO YOU WANT TO CONTINUE WITH ORIGINAL BUDGET? ENTER Y OR N '
[137]  TYRR←⍞
[138]  →PARA3×⍳(TYRR='Y')
[139] WRO:'ENTER NEW AMOUNT OF TRAINING BUDGET FOR FY',(⍕YEA+T-1),':'
[140]  BUDGE←,⎕
[141]  →PARA3×⍳(((⍴,BUDGE)=1)∧(1=+/BUDGE>0))
[142]  'YOU HAVE TO ENTER A POSITIVE NUMBER; TRY AGAIN.'
[143]  →WRO
[144] PARA3:'DO YOU WANT TO CONTINUE WITH ORIGINAL SCHOOL CAPACITY? ENTER Y OR N'
[145]  TYR←⍞
[146]  →PARA2×⍳(TYR='Y')
[147] WRO1:'ENTER SCHOOL CAPACITY FOR P ,V ,S (3 NUMBERS)'
[148]  SHOOC←,⎕
[149]  →PARA2×⍳((3=⍴,SHOOC)∧(3=+/SHOOC>0))
[150]  'YOU MUST ENTER 3 POSITIVE NUMBERS; TRY AGAIN.'
[151]  →WRO1
[152] PARA2:B←(BUDGE),(⍴,AP),(⍴,AV),(⍴,AS),CORA,COS,SHOOC
[153]  ' '
[154]  ' '
[155]  'DO YOU WANT TO SEE THE RESULTS FOR FY',(⍕YEA+T-1),' (ENTER Y) OR QUIT(ENTER N)?'
[156]  TYR←⍞
[157]  →COMTI×⍳(TYR='Y')
[158]  →0
[159] ⍝******** CALL OPTIMIZATION MODEL*****
[160] COMTI:'              '
[161]  ' '
[162]  '******************************************** '
[163]  '*                                            *'
[164]  '* THE RESULTS  FOR FY',(⍕YEA+T-1),' ARE THE FOLLOWING: * '
[165]  '*                                            *'
[166]  '********************************************'
[167]  W←(B ARIS QP)
[168] ⍝******* PRINT RESULTS PER CMF *********
[169]  D←⍴,NO
[170]  RECR←D↑W
[171]  W←D↓W
[172]  RR←⍳0
[173]  I←0
[174] PO:I←I+1
[175]  →LAST×⍳(D<I×100)
[176]  EKATO←100
[177]  →EKA
[178] LAST:EKATO←(D+100)-I×100
[179] EKA:D1←((I-1)×100)+⍳(EKATO)
[180]  R11←+/D1∘.=W
[181]  RR←RR,R11
[182]  →PO×⍳((I×100)<D)
[183]  RR←⍉(1,⍴RR)⍴,RR+RECR
[184]  RECR←,(((⍴AP)↑,RR)×CORA[1]),(((⍴AV)↑(⍴AP)↓,RR)×CORA[2])
[185]  RECR←⌊(((⍴NO),1)⍴,RECR,(((⍴AS)↑((⍴AP)↓(⍴AV))↓,RR)×CORA[3]))+0.5
[186]  RR←QP[;1],QP[;3],QP[;2],QP[;4],RR,RECR
[187]  SEP←+/⍉DIM
[188]  SEP1←(SEP[1],6)↑RR
[189]  SEP2←(SEP[2],6)↑(SEP[1],0)↓RR
[190]  SEP3←(SEP[3],6)↑((SEP[1]+SEP[2]),0)↓RR
[191]  J←0
[192]  REC←⍳0
[193] CONTI:J←J+1
[194]  ' '
[195]  'CMF ',(⍕NCMFS[J]),'  '
[196]  '******'
[197]  'DUTY      AUTHORIZED  SHORTAGE  NET REQUI- TRAINING  RECRUITMENT'
[198]  'POSITION  PERSONNEL   START OF  REMENTS    ENTRANTS  (TRAINING'
[199]  '          FY',(⍕YEA+T-1),'  FY',(⍕YEA+T),'       FY',(⍕YEA+T-1),'  FOR FY',(⍕YEA+T),'
       IN FY',(⍕YEA+T-1),'   GRADUATES)'
[200]  '--------  ----  ----  --------  --------  --------  ----------'
[201]  SE←DIM[J;]
[202]  D←((+/SE),7)⍴,((+/SE)×7)↑((+/↑/((J-1),3)↑DIM)×7)↓POS
[203]  RRR←((SE[1],6)↑SEP1).[1]((SE[2],6)↑SEP2),[1]((SE[3],6)↑SEP3)
```

```
[204]  SEP1←(SE[1],0)+SEP1
[205]  SEP2←(SE[2],0)+SEP2
[206]  SEP3←(SE[3],0)+SEP3
[207]  REC←REC,(,RRR[;6])
[208]  D,(12ρ7,0,6,0,10,0,10,0,10,0,12,0)▼RRR
[209]  →CONTI×ι(J<NCMF)
[210]  →MOVE×ι(STEADY≠1)
[211]  ' '
[212]  ' '
[213]  'DO YOU WANT TO RUN PROGRAM FOR MORE FY''S WITH AUTHORIZATIONS'
[214]  'OF LAST FY? ENTER Y OR N'
[215]  ' '
[216]  TYR←⍞
[217]  →MOVE×ι(TYR='N')
[218]  YEARS←YEARS+1
[219]  BBB←BBB,BUDGE
[220]  A2←A1
[221] MOVE:→END×ι(T=YEARS)
[222]  NOX←TC+(,RECR)
[223]  NO←NOO+REC
[224]  REC←0×REC
[225]  →NEWYEAR
[226] END:' '
[227]  ' '
[228]  'DO YOU WANT ANOTHER RUN FOR THE SAME YEAR(S) USING NEW VALUES FOR'
[229]  'COMPLETION RATES, COSTS OF TRAINING, BUDGET, AND SCHOOL CAPACITY?'
[230]  'ENTER Y OR N'
[231]  TYR←⍞
[232]  →EN×ι(TYR≠'Y')
[233]  REC←0×REC
[234]  T←0
[235]  QP[;3]←KEEPA1
[236]  A1←KEEPA1
[237]  QP[;2]←KTC
[238]  QP[;1]←KEEPA
[239]  NO←KNO
[240]  VALUE YEARS
[241]  →NEWYEAR
[242] EN:'*****END*****'
[243]  →0
       ▽
```

```
       ▽DATA[⍞]▽
       ▽ DATA A;AL
[1]    ⍝ THIS FUNCTION TRANSFERS THE DATA INTO THE MODEL ''AIRBORNE''
[2]    AL← 11 12 13 16 18 19 23 27 28 29 31 33 51 54 55 63 64 67 71
           74 76 79 81 84 91 92 94 95 96 97 98
[3]    →(A=AL)/CMF11,CMF12,CMF13,CMF16,CMF18,CMF19,CMF23,CMF27,CMF28
[4]   CMF11:POSI←P011
[5]    AUT←A111
[6]    AUT1←A112
[7]    →SK1×ι(YEARS='1')
[8]    AUT2←A113
[9]   SK1:INV←INV11
[10]   MAT←M11
[11]   →END
[12]  CMF12:POSI←P012
[13]   AUT←A121
[14]   AUT1←A122
[15]   →SK2×ι(YEARS='1')
[16]   AUT2←A123
[17]  SK2:INV←INV12
```

```
[18]  MAT←M12
[19]  →END
[20] CMF13:POSI←PO13
[21]  AUT←A131
[22]  AUT1←A132
[23]  →SK3×ι(YEARS='1')
[24]  AUT2←A133
[25] SK3:INV←INV13
[26]  MAT←M13
[27]  →END
[28] CMF16:POSI←PO16
[29]  AUT←A161
[30]  AUT1←A162
[31]  →SK4×ι(YEARS=1)
[32]  AUT2←A163
[33] SK4:INV←INV16
[34]  MAT←M16
[35]  →END
[36] CMF18:POSI←PO18
[37]  AUT←A181
[38]  AUT1←A182
[39]  →SK5×ι(YEARS=1)
[40]  AUT2←A183
[41] SK5:INV←INV18
[42]  MAT←M18
[43]  →END
[44] CMF19:POSI←PO19
[45]  AUT←A191
[46]  AUT1←A192
[47]  →SK6×ι(YEARS='1')
[48]  AUT2←A193
[49] SK6:INV←INV19
[50]  MAT←M19
[51]  →END
[52] CMF23:POSI←PO23
[53]  AUT←A231
[54]  AUT1←A232
[55]  →SK7×ι(YEARS=1)
[56]  AUT2←A233
[57] SK7:INV←INV23
[58]  MAT←M23
[59]  →END
[60] CMF27:POSI←PO27
[61]  AUT←A271
[62]  AUT1←A272
[63]  →SK8×ι(YEARS=1)
[64]  AUT2←A273
[65] SK8:INV←INV27
[66]  MAT←M27
[67]  →END
[68] CMF28:POSI←PO28
[69]  AUT←A281
```

```
[70]  AUT1←A282
[71]  →SK9×ι(YEARS=1)
[72]  AUT2←A283
[73] SK9:INV←INV28
[74]  MAT←M28
[75]  →END
[76] CMF29:POSI←P029
[77]  AUT←A291
[78]  AUT1←A292
[79]  →SKA×ι(YEARS=1)
[80]  AUT2←A293
[81] SKA:INV←INV29
[82]  MAT←M29
[83]  →END
[84] CMF31:POSI←P031
[85]  AUT←A311
[86]  AUT1←A312
[87]  →SKS×ι(YEARS='1')
[88]  AUT2←A313
[89] SKS:INV←INV31
[90]  MAT←M31
[91]  →END
[92] CMF33:POSI←P033
[93]  AUT←A331
[94]  AUT1←A332
[95]  →SKD×ι(YEARS=1)
[96]  AUT2←A333
[97] SKD:INV←INV33
[98]  MAT←M33
[99]  →END
[100] CMF51:POSI←P051
[101]  AUT←A511
[102]  AUT1←A512
[103]  →SKF×ι(YEARS=1)
[104]  AUT2←A513
[105] SKF:INV←INV51
[106]  MAT←M51
[107]  →END
[108] CMF54:POSI←P054
[109]  AUT←A541
[110]  AUT1←A542
[111]  →SKG×ι(YEARS=1)
[112]  AUT2←A543
[113] SKG:INV←INV54
[114]  MAT←M54
[115]  →END
[116] CMF55:POSI←P055
[117]  AUT←A551
[118]  AUT1←A552
[119]  →SKH×ι(YEARS=1)
[120]  AUT2←A553
[121] SKH:INV←INV55
```

```
[122]  MAT←M55
[123]  →END
[124] CMF63:POSI←P063
[125]  AUT←A631
[126]  AUT1←A632
[127]  →SKJ×ι(YEARS='1')
[128]  AUT2←A633
[129] SKJ:INV←INV63
[130]  MAT←M63
[131]  →END
[132] CMF64:POSI←P064
[133]  AUT←A641
[134]  AUT1←A642
[135]  →SKK×ι(YEARS='1')
[136]  AUT2←A643
[137] SKK:INV←INV64
[138]  MAT←M64
[139]  →END
[140] CMF67:POSI←P067
[141]  AUT←A671
[142]  AUT1←A672
[143]  →SKL×ι(YEARS='1')
[144]  AUT2←A673
[145] SKL:INV←INV67
[146]  MAT←M67
[147]  →END
[148] CMF71:POSI←P071
[149]  AUT←A711
[150]  AUT1←A712
[151]  →SKZ×ι(YEARS=1)
[152]  AUT2←A713
[153] SKZ:INV←INV71
[154]  MAT←M71
[155]  →END
[156] CMF74:POSI←P074
[157]  AUT←A741
[158]  AUT1←A742
[159]  →SKX×ι(YEARS=1)
[160]  AUT2←A743
[161] SKX:INV←INV74
[162]  MAT←M74
[163]  →END
[164] CMF76:POSI←P076
[165]  AUT←A761
[166]  AUT1←A762
[167]  →SKC×ι(YEARS='1')
[168]  AUT2←A763
[169] SKC:INV←INV76
[170]  MAT←M76
[171]  →END
[172] CMF79:POSI←P079
[173]  AUT←A791
```

```
[174]  AUT1←A792
[175]  →SKV×ι(YEARS=1)
[176]  AUT2←A793
[177] SKV:INV←INV79
[178]  MAT←M79
[179]  →END
[180] CMF81:POSI←PO81
[181]  AUT←A811
[182]  AUT1←A812
[183]  →SKB×ι(YEARS=1)
[184]  AUT2←A813
[185] SKB:INV←INV81
[186]  MAT←M81
[187]  →END
[188] CMF84:POSI←PO84
[189]  AUT←A841
[190]  AUT1←A842
[191]  →SKN×ι(YEARS=1)
[192]  AUT2←A843
[193] SKN:INV←INV84
[194]  MAT←M84
[195]  →END
[196] CMF91:POSI←PO91
[197]  AUT←A911
[198]  AUT1←A912
[199]  →SKM×ι(YEARS=1)
[200]  AUT2←A913
[201] SKM:INV←INV91
[202]  MAT←M91
[203]  →END
[204] CMF92:POSI←PO92
[205]  AUT←A921
[206]  AUT1←A922
[207]  →SKQ×ι(YEARS='1')
[208]  AUT2←A923
[209] SKQ:INV←INV92
[210]  MAT←M92
[211]  →END
[212] CMF94:POSI←PO94
[213]  AUT←A941
[214]  AUT1←A942
[215]  →SKW×ι(YEARS=1)
[216]  AUT2←A943
[217] SKW:INV←INV94
[218]  MAT←M94
[219]  →END
[220] CMF95:POSI←PO95
[221]  AUT←A951
[222]  AUT1←A952
[223]  →SKE×ι(YEARS=1)
[224]  AUT2←A953
[225] SKE:INV←INV95
```

```
[226]  MAT←M95
[227]  →END
[228] CMF96:POSI←P096
[229]  AUT←A961
[230]  AUT1←A962
[231]  →SKR×⍳(YEARS=1)
[232]  AUT2←A963
[233] SKR:INV←INV96
[234]  MAT←M96
[235]  →END
[236] CMF97:POSI←P097
[237]  AUT←A971
[238]  AUT1←A972
[239]  →SKT×⍳(YEARS=1)
[240]  AUT2←A973
[241] SKT:INV←INV97
[242]  MAT←M97
[243]  →END
[244] CMF98:POSI←P098
[245]  AUT←A981
[246]  AUT1←A982
[247]  →SKY×⍳(YEARS=1)
[248]  AUT2←A983
[249] SKY:INV←INV98
[250]  MAT←M98
[251] END:POSI←(((⍴,POSI)↑7),7)⍴,POSI
[252]  DDD←(+/POSI[;6]='P'),(+/POSI[;6]='V'),+/POSI[;6]='S'
[253]  →TWW1×⍳((⍴,AUT)=(⍴,POSI)↑7)
[254]  'FOR CMF ',(▼A),' POSITIONS AND AUTHORIZATIONS DIFFER IN LENGTH;'
[255]  'RESTART'
[256]  →0
[257] TWW1:→TWO×⍳((⍴,AUT)=⍴,AUT1)
[258]  'FOR CMF ',(▼A),' AUTHORIZATIONS DIFFER IN LENGTH FROM YEAR TO YEAR;'
[259]  'RESTART'
[260]  →0
[261] TWO:→ONE×⍳(YEARS=1)
[262]  →ONE×((⍴AUT)=⍴AUT2)
[263]  'FOR CMF ',(▼A),' LENGTH OF AUTHORIZATIONS DIFFER FROM YEAR TO YEAR;'
[264]  'RESTART'
[265]  →0
[266] ONE:
[267]  →WWW×⍳((⍴,INV)=⍴,AUT)
[268]  'FOR CMF ',(▼A),' VECTORS OF AUTHORIZED AND QUALIFIED PERSONNEL'
[269]  'DIFFER IN LENGTH; RESTART'
[270]  →0
[271] WWW:
[272]  →WWWW×⍳((×/(⍴,MAT))=((+/DDD)*2))
[273]  'FOR CMF ',(▼A),' THE MATRIX HAS WRONG DIMENTIONS; RESTART'
[274]  →0
[275] WWWW:
      ▽
```

```
      ∇VALUE[□]∇
      ∇ VALUE YEARS
[1]   ⍝THIS FUNCTION HELPS TO ENTRY NEW PARAMETERS IN THE MODEL.
[2]   KS4:'INPUT COMPLETION RATES FOR P,V,S (3 NUMBERS BETWEEN 0 AND 1)'
[3]    CORA←,□
[4]    →KK×⍳((3=⍴,CORA)∧(3=+/CORA>0)∧(3=+/CORA≤1))
[5]    'YOU MUST ENTER 3 NUMBERS BETWSEN 0 AND 1; TRY AGAIN.'
[6]    →KS4
[7]   KK:'INPUT COST OF 1 TRAINEE IN P,V,S (3 NUMBERS)'
[8]    COS←,□
[9]    →BBUD×⍳((3=⍴,COS)∧(3=+/COS>0))
[10]   'YOU MUST ENTER 3 POSITIVE NUMBERS; TRY AGAIN.'
[11]   →KK
[12]  BBUD:'ENTSR AVAILABLE BUDGET FOR EACH YEAR(',(⍕YEARS),' NUMBER(S))'
[13]   'IN DOLLARS (IN ONE LINE)'
[14]   BBB←,□
[15]   →KKK×⍳((YEARS=⍴,BBB)∧(YEARS=+/BBB>0))
[16]   'YOU HAVE TO ENTER ',(⍕YEARS),' POSITIVE NUMBERS; TRY AGAIN.'
[17]   →BBUD
[18]  KKK:'INPUT SCHOOL CAPACITY FOR P, V, S (3 NUMBERS)'
[19]   SHOOC←,□
[20]   →KKKK×⍳((3=⍴,SHOOC)∧(3=+/SHOOC>0))
[21]   'YOU MUST ENTER 3 POSITIVE NUMBERS; TRY AGAIN.'
[22]   →KKK
[23]  KKKK:
      ∇
      .



      ∇FORCAST[□]∇
      ∇ R←K FORCAST NN;UU;TR
[1]   ⍝THIS FUNCTION IMPLEMSNTS THE FORCASTING MODEL.
[2]    UU←(×/⍴NN)↑2
[3]    TR←(UU,UU)⍴,K
[4]    R←⌊((⍳⍴(NN[;1])+.×TR)+NN[;2])+0.5
      ∇
      .



      ∇SCHOOL[□]∇
      ∇ A SCHOOL Q;W;J;J1;J2;R
[1]   ⍝THIS FUNCTION PRODUCES REQUIRED BUDGET AND SCHOOL CAPACITIES
[2]   ⍝TO ACHISVE A SPECIFIC PERCENTAGE OF COVSRAGE.
[3]    Q[;4]←(Q[;3])×Q[;4]
[4]   SAC:'ENTER MINIMUM PERCENTAGE COVERAGE OF AUTHORIZATIONS REQUIRED'
[5]    'FOR EACH SQI; E.G.  .98 .9 .85 OF AUTHORIZATIONS TO BE COVERED'
[6]    'FOR P, V, AND S POSITIONS.'
[7]    W←□
[8]    →SWRE×⍳((+/(W≤0)+(W>1))=0)
[9]    'INVALID COMPLETION RATE; TRY AGAIN'
[10]   →SAC
[11]  SWRE:J←((J×W[1])≠J)+J←A[1]↑Q[;3]
[12]   J1←((J1×W[2])≠J1)+J1←(A[2])↑(A[1])↓Q[;3]
[13]   J2←((J2×W[3])≠J2)+J2←(⍴(A[3]))↓Q[;3]
[14]   J←(((J≠(Q[;4]))>0)×(J←J,J1,J2)≠Q[;4])+(Q[;2]≠Q[;4])×((0<Q[;2])∧(Q[;2]>Q[;4]))
[15]   'REQUIRED SCHOOL CAPACITIES TO ACHIEVE THIS COVERAGE AT THE END OF FY',(⍕YEA+T-1),' ARE:'
[16]   R←(⍕(⌊(+/A[1]↑J)↑A[4]),(⌊(+/(A[2]↑(A[1]↓J)))↑A[5]),⌊(+/((≠A[3])↑J))↑A[6])
[17]   R
[18]   'FOR P, V, S RESPECTIVELY'
[19]   ' '
[20]   ' '
[21]   'FOR FY',(⍕YEA+T≠1),' A BUDGET OF ',(⍕(+/((⍳R)×COS))),' DOLLARS'
[22]   'IS NEEDED TO COVER AUTHORIZATIONS UP TO THE ABOVE SPECIFIED LEVEL'
[23]   ' '
[24]   ' '
[25]   'DO YOU WANT TO SEE REQUIRED BUDGET AND SCHOOL CAPACITY FOR A'
[26]   'DIFFERENT PERCENTAGE COVERAGE? ENTER Y OR N'
[27]   TYR←□
[28]   →SAC×⍳(TYR='Y')
[29]   ' '
      ∇
```

```
      ∇ARIS[□]∇
      ∇ R←B ARIS P;SH;CORATE;MARG;SHP;SP;SV;SS;COSTS;A;DD;WW;D;E;BB;AA;AN;II
[1]   ⍝ THIS FUNCTION  PRODUCES  A  VECTOR  OF  POSITIONS OF THE INPUT
[2]   ⍝ WRERE THERE EXISTS MAX SHORTAGE-AFTER EACH RECRUITMENT.
[3]   ⍝ B←BUDGET,TOTAL P←V←S,COMPLETION RATES,COSTS,SCHOOL CAPACITY.
[4]   ⍝ P IS A MATRIX N×4;1ST AND 3RD COL.REPRESENT AUTHORIZED PERSONNEL,AND
[5]   ⍝ 2ND AND 4TH SHORTAGES FOR ORIGIN AND END OF YEAR FOR EACH MOS-SL-SQI.
[6]   ⍝FIRST ROWS CORRESPOND TO PARACHUTISTS(P),NEXT TO RANGERS(V)
[7]   ⍝AND LAST TO SPESIALISTS(S).
[8]    DD←(((P[;1])=0)×1E¯6)+P[;1]
[9]    SH←P[;2]
[10]   SH←SH+¯5000×(DD=1E¯6)
[11]   AN←(((P[;3])=0)×1E¯6)+P[;3]
[12]   E←3↑(1↓B)
[13]   BB←1↑B
[14]   CORATE←3↑(4↓B)
[15]   COSTS←3↑(7↓B)
[16]   SCH←¯3↑B
[17]   P←⌈/(E[1]↑SH)↓E[1]↑DD
[18]   V←⌈/(E[2]↑E[1]↑SH)↓E[2]↑E[1]↑DD
[19]   S←⌈/((-E[3])↑SR)↓(-E[3])↑DD
[20]   SP←⍳E[1]
[21]   SV←⍳E[2]
[22]   SS←⍳E[3]
[23]   SPC←SVC←SSC←1
[24]   SHP←P[;4]
[25]   SHP←SHP+¯5000×(AN=1E¯6)
[26]   POSMA←B GROUP⍀(⍴⍴P)⍴,DD,SH,AN,SHP
[27]  NEW:MARG←SH↑DD
[28]  LOOP:POSIT←MARG⍳AA←⌈/MARG
[29]   GROU←(MARG[↑⍋MARG])[2]
[30]   POSSA←1⌈(⌈((AA-GROU)×DD[POSIT])÷⌈/CORATE)
[31]   →FFF×⍳((POSSA×⌈/COSTS)≤BB)
[32]   POSSA←1⌈((⌈BB÷⌈/COSTS)
[33]  FFF:→NE×⍳(POSIT>E[1])
[34]   COST←COSTS[1]
[35]   →FFF1×⍳(POSSA≤SCH[1]-LP)
[36]   POSSA←1⌈SCH[1]-LP
[37]  FFF1:LP←LP+POSSA
[38]   COR←CORATE[1]
[39]   P←AA
[40]   POSITT←POSIT×((⍳POSSA)>0)
[41]   POSMA←POSMA,POSITT
[42]   →REP1×⍳(LP≥SCR[1])
[43]   →TRANSF
[44]  NE:→NEX×⍳(POSIT>E[1]+E[2])
[45]   COST←COSTS[2]
[46]   →FFF2×⍳(POSSA≤SCH[2]-LV)
[47]   POSSA←1⌈SCH[2]-LV
[48]  FFF2:LV←LV+POSSA
[49]   COR←CORATE[2]
[50]   V←AA
[51]   POSITT←POSIT×((⍳POSSA)>0)
[52]   POSMA←POSMA,POSITT
[53]   →REP2×⍳(LV≥SCR[2])
[54]   →TRANSF
[55]  NEX:
[56]   COST←COSTS[3]
[57]   →FFF3×⍳(POSSA≤SCR[3]-LS)
[58]   POSSA←1⌈SCH[3]-LS
[59]  FFF3:LS←LS+POSSA
[60]   COR←CORATE[3]
[61]   S←AA
[62]   POSITT←POSIT×((⍳POSSA)>0)
[63]   POSMA←POSMA,POSITT
[64]   →REP3×⍳(LS≥SCH[3])
[65]  TRANSF:MARG[POSIT]←(SH[POSIT]←((SH[POSIT])-COR×POSSA))↓DD[POSIT]
[66]   SHP[POSIT]←(SHP[POSIT])-COR×POSSA
[67]   BB←(BB-COST×POSSA)
[68]   →BU1
[69]  REP1:SP←¯10000000×(SP≠0.01)
[70]   SPC←0
[71]   →DE11×⍳(II=0)
[72]   DEK←1
[73]  DE11:→DE1×⍳((AA>0)∨(II=1))
[74]   II←1
[75]   DD←AN
[76]   SH←SHP
[77]  DE1:SH←,SP,((⍴,SV)↑⍴,SS)↓(⍴,SP)↑SH
[78]   SHP←,SP,((⍴,SV)↑⍴,SS)↓(⍴,SP)↑SHP
[79]   →BU
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[80] REP2:SV←¯10000000×(SV≠0.01)
[81]  SVC←0
[82]  →DE22×⍳(II=0)
[83]  DEO←1
[84] DE22:→DE2⍳((AA>0)∨(II=1))
[85]  II←1
[86]  DD←AN
[87]  SH←SHP
[88] DE2:SH←,((⍴,SP)↑SH),SV,((⍴,SS)↑((⍴,SP)↑⍴,SV)↑SH)
[89]  SHP←,((⍴,SP)↑SHP),SV,((⍴,SS)↑((⍴,SP)↑⍴,SV)↑SHP)
[90]  →BU
[91] REP3:SS←¯10000000×(SS≠0.01)
[92]  SSC←0
[93]  →DE33×⍳(II=0)
[94]  DEU←1
[95] DE33:→DE3×⍳((AA>0)∨(II=1))
[96]  II←1
[97]  DD←AN
[98]  SH←SHP
[99] DE3:SH←,(((⍴,SP)↑⍴,SV)↑SH),SS
[100]  SHP←,(((⍴,SP)↑⍴,SV)↑SHP),SS
[101] BU:BB←BB-COST×POSSA
[102]  →NEW×⍳((BB≥L/COSTS)∧(((E[1]>0)∧0<SCR[1]-LP)∨((E[2]>0)∧0<SCH[2]-LV)∨((E[3]>0)∧0<SCR[3]-LS)))
[103]  →RES1
[104] BU1:→BU2×⍳((AA>0)∨(II=1))
[105]  II←1
[106]  →PPR×⍳(0=SCR[1]↓LP)
[107]  DEK←1
[108] PPR:→PPR1×⍳(0=SCH[2]↓LV)
[109]  DEO←1
[110] PPR1:→PPR2×⍳(0=SCH[3]↓LS)
[111]  DEU←1
[112] PPR2:DD←AN
[113]  SH←SHP
[114]  →NEW×⍳(BB≥L/COSTS)
[115]  →BU3
[116] BU2:→LOOP×⍳(BB≥L/COSTS)
[117] BU3:' '
[118]  ' '
[119]  'BINDING CONSTRAINT IS BUDGET:'
[120]  →RES2
[121] RES1:→EPI×⍳(((SPC=0)∧(SVC=0)∧SSC=0)∨(0≠+/0>SCH-LP,LV,LS))
[122]  ' '
[123]  ' '
[124]  'BINDING CONSTRAINT IS BUDGET:'
[125]  →RES2
[126] EPI:' '
[127]  ' '
[128]  'BINDING CONSTRAINT IS SCHOOL CAPACITY:'
[129] RES2:R←POSMA
[130]  ⎕PP←4
[131]  'REMAINING BUDGET FOR THIS YEAR IS:',(▼BB),' DOLLARS.'
[132]  'REMAINING SCHOOL CAPACITIES FOR P, V, S ARE:',(5 0 ▼SCH-(LP,LV,LS)),'.'
[133]  →TEL×⍳((DEK=1)∧(DEO=1)∧(DEU=1))
[134]  →TELI×⍳((DEK=0)∧(DEO=0)∧(DEU=0))
[135]  →PRE1×⍳(DEK=1)
[136]  'MAX UNCOVERED EXISTING SRORTAGE FOR PARACHUTISTS AND FY',(▼YEA+T-1),' IS:',▼P
[137]  →PRE22
[138] PRE1:'MAX UNCOVERED PREDICTED SHORTAGE FOR PARACHUTISTS AND FY',(▼YEA+T),' IS:',▼P
[139] PRE22:→PRE2×⍳(DEO=1)
[140]  'MAX  UNCOVERED  EXISTING  SHORTAGE  FOR  RANGERS AND FY',(▼YEA+T-1),' IS:',▼V
[141]  →PRE23
[142] PRE2:'MAX UNCOVERED  PREDICTED  SHORTAGE  FOR  RANGERS AND FY',(▼YEA+T),' IS:',▼V
[143] PRE23:→PRE3×⍳(DEU=1)
[144]  'MAX UNCOVERED EXISTING  SHORTAGE  FOR SPECIALISTS AND FY',(▼YEA+T-1),' IS:',▼S
[145]  →TELOS
[146] PRE3:'MAX UNCOVERED PREDICTED  SHORTAGE FOR SPECIALISTS AND FY',(▼YEA+T),' IS:',▼S
[147]  →TELOS
[148] TELI:'THE MAX UNCOVERED PERCENTAGES OF EXISTING SHORTAGE FOR FY',(▼YEA+T-1)
[149]  →TELII
[150] TEL:'THE MAX UNCOVERED PERCENTAGES OF PREDICTED SHORTAGE FOR FY',▼YEA+T
[151] TELII:'FOR P,V,AND S RESPECTIVELY WILL BE LESS THAN:'
[152]  (P),(V),(S)
[153] TELOS:'(NEGATIVE NUMBERS INDICATE SURPLUSES)'
[154]  ' '
[155]  '   '
      ▼
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      ∇GROUP[□]∇
      ∇ R←B GROUP P;SE;TT;LP1;LV1;LS1;GROU;G;RP;RV;RS
[1]   ⍝THIS FUNCTION INCREASES THE EFFICIENCY OF OPTIMIZATION MODEL.
[2]    II←DEK←DEO←DEU←0
[3]    TT←1
[4]    LP1←LV1←LS1←0
[5]    GROU←⍳0
[6]    DD←P[;1]
[7]    SH←P[;2]
[8]   PAL:SE←RP×(0<RP←SH-(1-TT)×DD)
[9]    RP←⌈¯0.5+(B[2]+SE)÷B[5]
[10]   RV←⌈¯0.5+(B[3]+B[2]+SE)÷B[6]
[11]   RS←⌈¯0.5+((-E[3])+SE)÷B[7]
[12]   LP←LP1+(+/RP)
[13]   LV←LV1+(+/RV)
[14]   LS←LS1+(+/RS)
[15]   →SMALL×⍳((LP>B[11])∨(LV>B[12])∨(LS>B[13]))
[16]   →SMALL×⍳(0>G←(B[1]-((LP×B[8])+(LV×B[9])+LS×B[10])))
[17]   →TET×⍳((II=1)∨(TT<1))
[18]   II←DEK←DEO←DEU←1
[19]   DD←P[;3]
[20]   SH←SHP←P[;4]-SE
[21]   LP1←LP
[22]   LV1←LV
[23]   LS1←LS
[24]   GROU←RP,RV,RS
[25]   →PAL
[26]  SMALL:TT←TT-0.04
[27]   →PAL
[28]  TET:→TE×⍳(1<⍴,GROU)
[29]   GROU←RP,RV,RS
[30]   SHP←SHP-SE
[31]   →TE1
[32]  TE:GROU←GROU+(RP,RV,RS)
[33]   SHP←SH-SE
[34]  TE1:SH←SH-SE
[35]   BB←G
[36]   R←GROU
       ∇
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